Final report

OWMC
**Ontario
Waste Management
Corporation**

A provincial crown corporation

ecologistics
limited

SITE ASSESSMENT
PHASE 4B: AGRICULTURE

Prepared for
The Ontario Waste Management Corporation

Submitted by

Ecologistics Limited

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ecologistics limited PLANNERS, LANDSCAPE ARCHITECTS, AND ENVIRONMENTAL SCIENTISTS

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January 29, 1988

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Attention: Ms. B.J. Sakauye
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Re: Site Assessment, Phase 4B: Agriculture

We are pleased to forward the final copy of our Phase 4B technical report.

This report documents our analysis of agricultural factors relative to OWMC's Preferred Site (LF-9C) and our inputs to the work of other site assessment consultants.

We thank you for this opportunity to be of service and trust that the report fulfills your requirements.

Yours very truly,

DR Cressman

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EXECUTIVE SUMMARY

PURPOSE

This report presents the results of the agricultural impact assessment undertaken as part of Phase 4B of the Ontario Waste Management Corporation (OWMC) site assessment process. The purpose of the Phase 4B site assessment was to assess the risks and impacts that may occur as a result of construction, operation and decommissioning of OWMC's proposed liquid industrial and hazardous waste treatment and disposal facility, and to propose appropriate impact management measures. The selection of the preferred site in West Lincoln occurred in the Phase 4A stage of the Facilities Development Process.

The investigation is structured around a broad range of risk and impact factors which relate to specific agricultural concerns. A definition and rationale for each of the factors is provided, as are data sources, analysis methods, and results of the analysis including impact predictions with and without impact management measures.

The agricultural impact analysis is integrated into the overall site assessment process in Draft Environment Assessment: Site Assessment Volume (OWMC, 1988).

SCOPE

The Phase 4B agricultural impact assessment was guided by a number of goals and objectives, and by assumptions about facility characteristics.

The site assessment process took into consideration three goals formulated by OWMC. These are, in order of priority:

- to minimize risk to human health;
- to minimize environmental impact, and;
- to minimize financial cost to OWMC and the people of Ontario.

The Phase 4B site assessment objectives relative to these goals are outlined in Chapter 1; with respect to agriculture, they are:

- to predict the impacts on productive agricultural soils, on the agricultural economy and on the agricultural community;
- to assess the overall significance of the impacts;
- to identify the need and opportunity for impact management;
- to recommend specific impact management measures, and;
- to identify and develop monitoring programs and contingency measures.

In assessing impacts to agriculture, it was necessary to consider various facility characteristics such as construction, operation and decommissioning schedules, the total volume of waste to be treated, the methods of treatment and disposal (i.e. incineration, physical-chemical treatment, and landfilling) and the committed on-site mitigation measures. These facility characteristics will influence the type and extent of direct impacts such as emission effects on crops as well as potential indirect effects such as impacts on agricultural land values. Facility characteristic assumptions appear in Chapter 2.

Each agricultural risk and impact factor was analysed using indicators that correspond to specific changes that are anticipated in the agricultural environment. The factors and indicators provided a basis for identification, analysis and prediction of facility impacts occurring within a number of impact zones including the site, the local community, the access route and the region.

The local community was sub-divided into a Direct Impact Zone comprised of properties exposed to cumulative nuisance effects (e.g. noise, dust, visual intrusion), and an Indirect Impact Zone in which direct impacts are less prominent.

The agricultural factors and indicators and their associated impact zones are shown on Table 1.

METHODS

Data collection tasks were organized on the basis of impact zones, the boundaries of which followed property boundaries. Ministry of Revenue Assessment Roll information was used to identify owners and property boundaries.

The detailed investigations conducted in Phase 4B necessitated the collection of a considerable amount of primary data. These data were collected by way of personal interviews with farm operators on-site, in

TABLE 1

AGRICULTURAL IMPACT FACTORS AND INDICATORS BY STUDY AREA

STUDY AREA	FACTOR	INDICATOR
Site	Farm Displacement	Total Displacement of Farms
	Loss of Farmland	Loss of Farmland
Local Community	Farm Displacement	Partial Displacement of Farms
	Farm Family/Farm Operator Disruption	Exposure to Nuisance Effects
	Farm Productivity Impacts	Exposure to Nuisance Effects Atmospheric Emission Effects Downstream Agricultural Activity
	Farm Business Impacts	Decrease in Property Value Loss of Product Sales Local Services
Local Community	Agricultural Community Impacts	Out-Migration of Farm Operators Non-Farm In-Migration Erosion of Community Networks Off-Farm Employment with OWMC Change in Local Agricultural Character
	Agribusiness Impacts	Loss of Sales
Access Route	Loss of Farmland	Loss of Farmland
	Farm Family/Farm Operation Disruption	Exposure to Nuisance Effects
	Farm Productivity Impacts	Exposure to Nuisance Effects Interference with Farm Vehicles Access Route Risk
Region	Farm Productivity Impacts	Atmospheric Emissions Effects

the local community, and along the access route, and by supplemental field surveys of land uses. Secondary data were used to further supplement the primary data. These included Census of Agriculture data (1961 to 1986), agricultural production statistics from the Ontario Ministry of Agriculture and Food, and information from a number of literature reviews.

Meetings were held with groups of farmers in the vicinity of the preferred site to review draft descriptions of existing agricultural conditions (Chapter 4 of this report) and to discuss predicted impacts and potential impact management measures. Contacts with agricultural marketing boards, commodity groups, and food processing industries were initiated.

A review of agricultural impacts associated with comparable industrial facilities was undertaken (Chapter 6) to secure available documentation of and farm operator perceptions of impacts. Information was also obtained on impact management measures used elsewhere and some farm operator responses to these were also obtained.

After collection, compilation and verification of the data, a number of analyses were undertaken. Future agricultural conditions were estimated based on an analysis of trends in land use, population, farm size, etc., and the relevant forces affecting each of these (Chapter 5). Impact scenarios were developed and sensitivity analyses completed to determine the potential range of impacts on agriculture. The relative severity of these impacts was then evaluated. These impact predictions and evaluation procedures are outlined in Chapter 3.

Next, the predicted impacts to agriculture were reviewed in light of the impact management programs and policies under consideration by OWMC and its consultants. The effectiveness of these impact management measures in mitigating or compensating for agricultural impacts was assessed, and residual impacts to agriculture were identified. Finally, potential monitoring and contingency programs were identified to address remaining areas of uncertainty associated with facility risk and impact predictions.

PREMISES

The analysis conducted by Ecologistics Limited incorporated information from OWMC and other site assessment consultants. The consultants and the nature of the information provided are noted below:

Monenco Limited
- facility characteristics assumptions
- location of site service corridors

Ontario Research Foundation
- air emission and dust dispersion data

Institute of Environmental Research
- farm and non-farm resident data
- future scenario information

Morehouse Economic Planning Consultants
- property value impacts
- off-farm employment with OWMC
- future scenario information
- regional economic impacts

Gartner Lee Associates Limited
- downstream water uses and impacts

Environ Corporation

- risk to crops and livestock

Leon Kentridge Associates Limited

- future scenario information

EDA Collaborative Inc.

- mapping of visual intrusion zones
- visual mitigation

S.S. Wilson

- site and access route noise impacts
- noise mitigation

M.M. Dillon (transportation)

- OWMC vehicle impacts

Ontario Waste Management Corporation (OWMC)

- on- and off-site impact management programs and policies

Details on the linkages with OWMC and the other site assessment consultants are provided throughout the report. Any comments or qualifications regarding the data in the reports of other consultants noted above apply equally to this report.

POSTULATES

In each stage of the Facilities Development Process, the basic postulate of the agricultural analysis is that agricultural concerns are best addressed by avoiding or at least minimizing the impacts on the agricultural production system. Significant, immitigable impacts to the land base, farm economy, and farm population could affect the viability of the production system and, in turn, affect the well being of the community.

Because agriculture is a complex biophysical, social and economic system, the analysis employs a broad range of factors and indicators to describe the relevant components of the agricultural production system and to determine the relative potential for impact.

The analysis was carried out with full recognition that our knowledge about the precise nature and extent of agricultural impacts that can result from such a facility is limited. Although the amound of land to be transferred to non-agricultural uses and the number of farms displaced on-site can be measured, other potential impacts such as out-migration of farm families cannot be accurately forecase and measured. Notwithstanding these limitations, it was determined that useful predictions of risk and impact could be made and that statements of prediction reliability would help determine the need for impact management measures.

The prediction of impacts is based on assumptions about facility characteristics as well as future conditions at the time the facility is built, operated and eventually decommissioned. A basic classification of impacts to be evaluated is proposed in the form of a set of impact factors and indicators.

STATUS OF THE DATA

Most of the impact prediction and analysis in this report is based on primary data. These sources include: personal interviews with farm operators in the site, local community and access road study areas; roadside land use surveys (crops and livestock); meetings with farm operators, marketing board representatives, agricultural commodity groups, food processors and Ontario Ministry of Agriculture and Food (O.M.A.F.) personnel.

A response rate of 56 percent was achieved for the farm interviews in the local community. Where permission for interviews was not granted by the farm operator, data were obtained by roadside observation of crop types and livestock numbers. Information on type and number of livestock collected during Phase 4A was also used to supplement the Phase 4B data base.

The data employed in the analysis were checked at several points for accuracy and representativeness. To ensure the accuracy of the primary data, computer coding and data entry were checked and survey responses were analysed for consistency.

To verify that survey responses were representative of all farms in the study area, a number of statistical comparisons were made with data from the 1986 Census of Agriculture. The majority of tests confirmed that survey response data were similar to the Census data (Appendix D). Annual agricultural production statistics published by O.M.A.F. were used to compare regional crop yield statistics with those reported in the local community survey.

To minimize difficulties associated with prediction uncertainty, information on impacts associated with reasonable comparable facilities was obtained and analyzed. Differences in facility characteristics and in local conditions around these facilities precluded direct comparisons to the OWMC facility and preferred site. The documentation of reasons for the impacts and the effectiveness of management measures also provided insight into ways in which the interests of the agricultural community could best be protected around OWMC's preferred site.

MAIN FINDINGS

FARM DISPLACEMENT

The displacement of on-site farms and off-site farms that own land on-site is considered to be a significant impact for the affected farm operators. Two dairy farmers and one retired farmer would be affected. The dairy farms are both established and on-going operations. The impact will be significant because the on-site operation must close down while the off-site operator will lose land that is needed to support the existing operation. From a community perspective, the impact associated with the displacement of these farms is minor.

Displacement impacts on affected farmers are largely subject to compensation under provisions of the Ontario Expropriations Act. No significant residual financial impacts are anticipated, though residual impacts of a personal nature may be significant.

LOSS OF FARMLAND

Within a regional context, loss of farmland both on- and off-site will be minor since it involves a relatively small area (124 ha). As well, the soils involved are moderately productive relative to alternative sites that were considered. Nevertheless, loss of farmland is essentially immitigable. Off-site measures such as windbreaks and drainage improvements could be used to compensate for the loss of farmland by enhancing the productive capacity of local croplands.

FARM FAMILY/FARM OPERATOR DISRUPTION

Six farms located in close proximity to the site will experience significant disruption due to increased noise levels, visual and dust effects associated with facility construction and operation. All six farm operations are full-time, and five of the six are raising livestock.

Fifteen other farms within the direct impact zone will experience moderate to high levels of impact for at least one of several nuisance effects, and all will be subject to cumulative nuisance effects. Beyond the direct impact zone in the local community several operations will experience moderate levels of visual intrusion.

Although negligible noise and dust effects were anticipated along the access route, an increase in the level of disruption due to traffic interference with farm vehicles is expected and is an expressed concern of farm operators using portions of this route. High existing traffic volumes along Regional Road 24 mean that incremental effects of OWMC traffic are relatively small; but there are a large number of receptors involved - namely farm vehicles, farm gate customers and service vehicles. Fewer receptors are found on Highway 20 and Schram Road. On Schram Road the incremental increases in traffic volume are large. Certain road conditions may also exacerbate interference problems.

A number of on- and off-site mitigation measures can reduce the levels of noise, dust and visual impact; however, cumulative effects are still expected to cause severe disruption of farm families and farm operators in the direct impact zone. The six operators experiencing high levels of cumulative nuisance effects will be eligible for buy-out. Other farmers within the direct impact zone who choose to leave the area because of residual impacts and risk will have recourse through the Property Value Protection Plan. Any financial loss caused by property value effects will be compensated.

Additional mitigative measures for those operators choosing to stay in the direct impact zone should be considered by OWMC. Such measures could include relocating the residence on existing farm properties to alleviate residual impacts.

The hardship policy and mechanisms for resolving claims against OWMC will be available to offset financial burdens associated with other special cases of unmitigatable impacts, should they occur within the local community or along the access route.

FARM PRODUCTIVITY IMPACTS

Productivity impacts arising from exposure to nuisance effects (e.g. noise, dust), atmospheric emissions, and site stormwater run-off controls should be negligible. Adverse effects on crops and livestock are unlikely. However, it is recognized that the prediction of risk is subject to uncertainty and that there is widespread perception among farm operators that air and water pollution as well as crop and livestock contamination will occur. In light of the uncertainty and the level of expressed concern, a mechanism is needed to verify the results of the risk assessment. Crop and livestock biomonitoring can fulfill this role.

Should an incident arise in which a claim of productivity impact is brought against OWMC, any losses will be reviewed under the financial claims resolution mechanism or the hardship policy.

Influencing negative perceptions of farm operators in the local community regarding facility effects will be an ongoing, long-term process. Effective communication programs backed by crop and livestock monitoring programs in which local people and regulatory agencies are fully involved are the basis of allaying public fears. Confidence in the facility will also build if an incident-free performance record is achieved.

FARM BUSINESS IMPACTS

An expected depression of farm real estate values in the direct impact zone may have considerable impact on the near-term financial planning of affected farmers. However, with OWMC's Property Value Protection Plan in place, farm loans officers in lending institutions should be adequately assured of the stability of land value and farm operator access to credit should not be jeopardized.

Consumer fears of contamination leading to loss of product sales are not expected to be a significant impact. Should cases of actual product contamination or of loss of buyers due to the mere presence of the facility arise OWMC's Financial Security and Claims Policy will cover any associated liability. Communication and monitoring efforts to allay consumer suspicions of product acceptability should parallel those designed to allay fears of productivity impacts (see preceding factor discussion).

AGRICULTURAL COMMUNITY IMPACTS

Perhaps the most significant long-term indirect agricultural impact will be felt at the community level. Some out-migration of farm operators may occur, the most likely scenario involving the departure of a number of operators in the direct impact zone who would experience cumulative nuisance effects and perhaps, concerns about risk. Their departure would represent a direct loss of productive capacity, particularly where livestock facilities and quotas are involved. Their departure would also disrupt existing community networks and farm organizations. Other farmers are expected to take up the vacated land, but non-farmers may also move on to farm property. The end result of these changes could include a shift away from livestock-based operations, an increase in farm land rentals, an overall reduction in active farm land area, a higher proportion of non-farm rural residents, leading potentially to farm/non-farm land use conflicts.

Impact management programs will minimize indirect impacts to the extent that, by reducing direct effects, they prevent the adverse reactions of affected individuals.

AGRIBUSINESS IMPACTS

The potential loss of farms and farm production would result in a secondary effect on agribusiness due to loss of sales. Smaller local establishments or contractors such as custom operators are most vulnerable to the loss of business. However the impact on agribusiness establishments is not expected to be significant since any decline in sales will likely be temporary as vacated farms are taken up by other farmers.

OWMC's intent to keep acquired farmland in agriculture, along with the Township's implementation of land use controls, should prevent a substantial erosion of agriculture and thus of agribusiness income.

CONCLUSIONS AND RECOMMENDATIONS

As noted in the main findings, facility impacts are generally expected to be low. OWMC's proposed impact management programs are expected to be adequate to mitigate most agricultural impacts. However, there remain areas of uncertainty associated with the prediction of facility risk and impact, particularly with respect to:

- impacts of air emissions on crops and livestock,
- indirect impacts such as property value changes, out-migration of farm families, consumer acceptance of local farm products, changes in local agricultural character, and agribusiness impacts.

Lands acquired off-site provide OWMC with its greatest opportunity for controlling community effects. These lands could be assembled into larger blocks and sold or rented back to farm operators in order to promote continuing agricultural production. Beyond this, OWMC can lend corporate support to regional or municipal policy initiatives that promote agriculture. OWMC should also use communication and monitoring programs to maintain a dialogue with the farm community and to assess how that community is responding and adjusting to facility impacts.

It is recommended that monitoring programs be established in three different areas to reduce the level of impact uncertainty and to signal the need for further mitigation and compensation should unexpected impacts emerge. Monitoring programs should include:

- biomonitoring of crops and livestock to detect any contaminant problems,
- agricultural productivity monitoring to detect yield effects,

- socio-economic monitoring to evaluate changes in the agricultural community.

Contingency measures, including emergency response planning and public information programs, are required to offset the effects of potential release of contaminants. An incident-free facility performance record is as important as any other means of reducing real and perceived risk to the agricultural community.

CHAPTER 1

INTRODUCTION

1.1 PURPOSE OF THIS REPORT

This report documents the agricultural impact assessment undertaken as part of Phase 4B of the Ontario Waste Management Corporation (OWMC) Facilities Development Process (Figure 1.1). A detailed assessment was undertaken of the preferred siting option (Figure 1.2). Its purpose was to assess the risks and impacts that may occur as a result of constructing and operating the waste treatment and disposal facility and to propose appropriate impact management measures.

The Phase 4B agricultural analyses contributed to the overall assessment of the preferred siting option. Documentation of the entire Phase 4B site assessment process appears in the Draft Environmental Assessment: Site Assessment Volume (OWMC, 1988).

The goals of the facilities development process are, in order of priority:

- to minimize risk to human health,
- to minimize environmental impact, and
- to minimize financial costs to OWMC and the people of Ontario.

Within these goals or guiding principles, the following objectives were specified for Phase 4B.

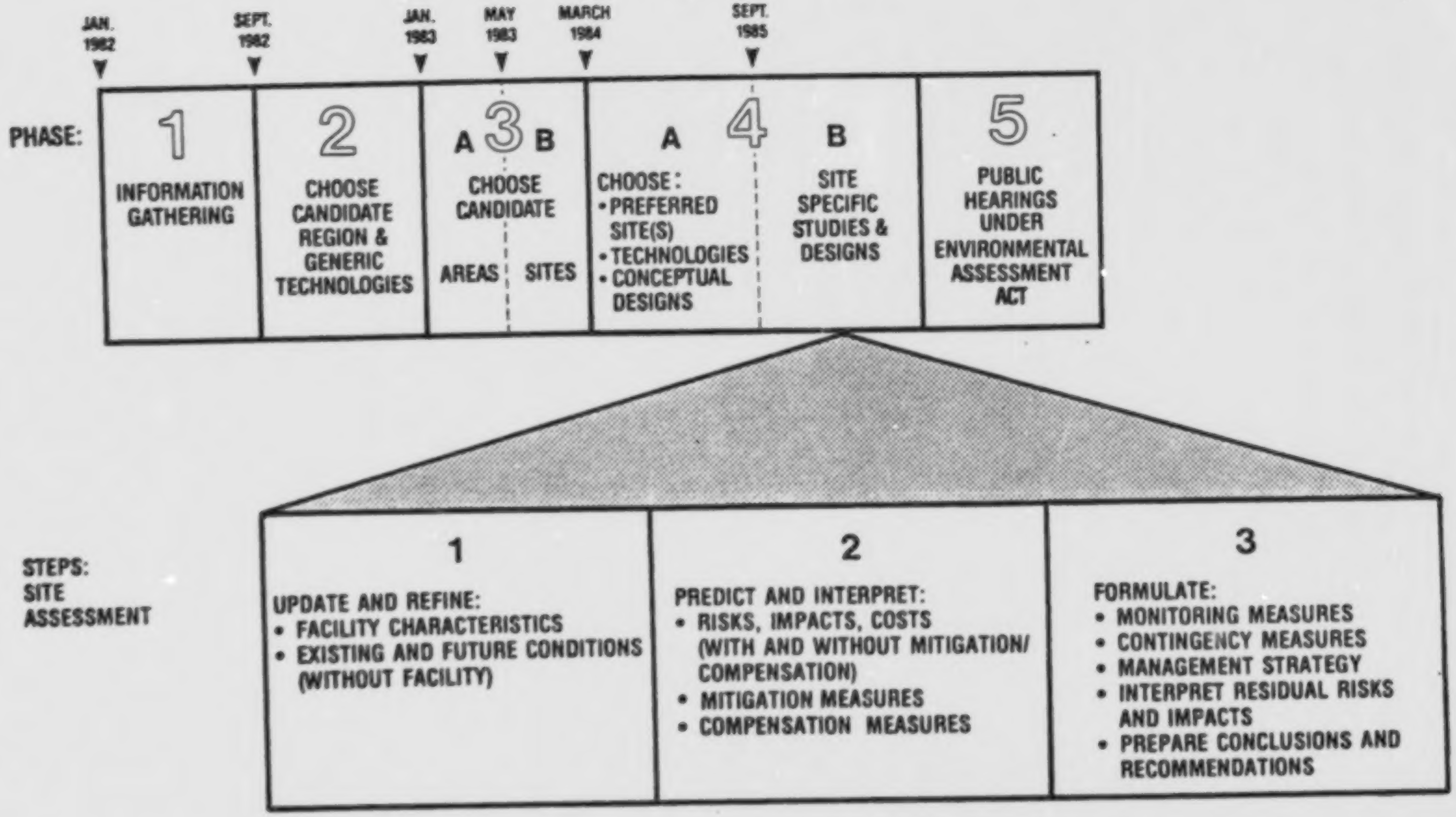
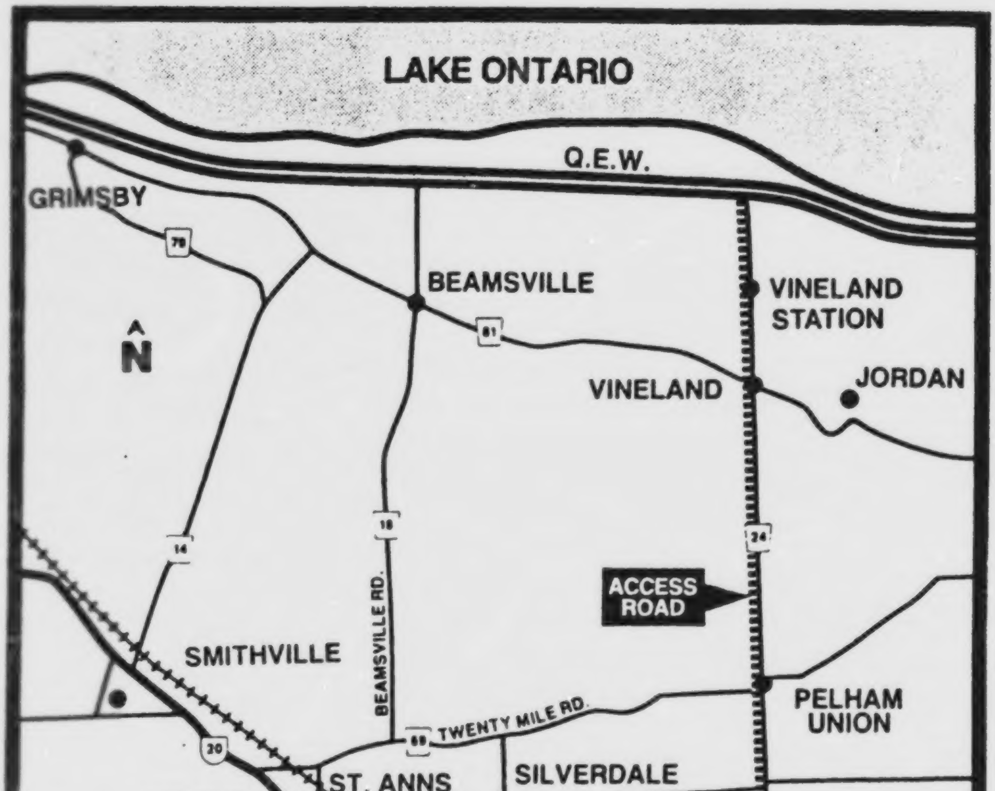

JAN. 1982
SEPT. 1982
JAN. 1983
MAY 1983
MARCH 1984
SEPT. 1985
PHASE:
1
INFORMATION GATHERING
2
CHOOSE CANDIDATE REGION & GENERIC TECHNOLOGIES
A 3 B
CHOOSE CANDIDATE
AREAS
SITES
A 4 B
CHOOSE:
• PREFERRED SITE(S)
• TECHNOLOGIES
• CONCEPTUAL DESIGNS
SITE SPECIFIC STUDIES & DESIGNS
5
PUBLIC HEARINGS UNDER ENVIRONMENTAL ASSESSMENT ACT
STEPS: SITE ASSESSMENT
1
UPDATE AND REFINE:
• FACILITY CHARACTERISTICS
• EXISTING AND FUTURE CONDITIONS (WITHOUT FACILITY)
2
PREDICT AND INTERPRET:
• RISKS, IMPACTS, COSTS (WITH AND WITHOUT MITIGATION/ COMPENSATION)
• MITIGATION MEASURES
• COMPENSATION MEASURES
3
FORMULATE:
• MONITORING MEASURES
• CONTINGENCY MEASURES
• MANAGEMENT STRATEGY
• INTERPRET RESIDUAL RISKS AND IMPACTS
• PREPARE CONCLUSIONS AND RECOMMENDATIONS

FIGURE 1.1
Facilities Development Process

Township of West Lincoln, Regional Municipality of Niagara. Local Detail.


LAKE ONTARIO
Q.E.W.
GRIMSBY
79
BEAMSVILLE
81
VINELAND STATION
VINELAND
JORDAN
N
14
18
24
ACCESS ROAD
BEAMSVILLE RD.
SMITHVILLE
PELHAM UNION
TWENTY MILE RD.
69
20
ST. ANNS
SILVERDALE
SIXTEEN RD.
SILVERDALE RD.
4TH CONCESSION
BISMARCK
RD.
BISMARCK RD.
20
27
PREFERRED SITE
VAUGHAN RD. W. E.
SCHRAM RD.
GEE RD.
BOYLE RD.
HEASLIP RD.
KRICK RD.
ELCHO RD.
BOYLE
WELLANDPORT
63
CANBOROUGH RD.
PORT DAVIDSON
CREEK RD.
47
27
WELLAND RIVER
45
29
0 1 2 3 4 Miles
0 1 2 3 4 Kilometres

OWMC, 1985.

Ontario
Waste Management
Corporation

Preferred Site

Figure 1.2

- verify the findings of Phase 4A;
- define the existing (or baseline) environmental conditions of the preferred siting option;
- project future changes in environmental conditions given no facility;
- predict and assess potential risk and impacts that may be associated with the proposed facility design, operations, and decommissioning;
- identify, develop and compare appropriate impact management measures to prevent, minimize or offset the potential risk and impacts associated with the proposed facility design and operations and decommissioning;
- interpret residual risk and impacts (after impact management);
- identify and develop monitoring programs to detect changing environmental conditions associated with the OWMC facility and thereby determine the effectiveness of impact management measures; and
- prepare documentation in accordance with the requirements of Ontario's Environmental Assessment Act.

In keeping with the OWMC goals and the Phase 4B site assessment objectives, agricultural objectives for Phase 4B were established. These were: to predict the impacts on productive agricultural resources on the agricultural economic system and on the agricultural community; to assess the overall significance of the impacts; to identify the need and opportunity for impact management, to recommend specific impact management measures, to assess residual impacts after impact management, and to identify and develop monitoring programs.

The remainder of this chapter develops the context for the work conducted by Ecologistics Limited. Chapters 2 to 9 document the agricultural impact assessment.

1.2 PHASE 4B SITE ASSESSMENT PROCESS

In the Phase 4B site assessment process consultants undertook independent analyses but shared expertise. Table 1.1 shows the contribution of Ecologistics Limited to the work of other OWMC consultants, and the specific data inputs provided by others to Ecologistics Limited. Details on the linkages are noted throughout this report.

M.M. Dillon Limited, under the general guidance of OWMC, was responsible for the technical synthesis of the Phase 4B assessment. The integration of the independent consultant reports is provided by OWMC (1988).

The OWMC Facilities Development Process is being undertaken in five phases. There were three major steps comprising the Phase 4B Site Assessment Process (Figure 1.1) dealing in turn with updating and refinement of background information, impact prediction and interpretation, and formulation of an impact management strategy. An outline of the tasks undertaken by Ecologistics Limited in each of the Phase 4B steps is provided below.

1.2.1 UPDATING AND REFINEMENT OF BACKGROUND INFORMATION

a) Facility Characteristics

Once the preferred site was selected, Monenco Limited undertook detailed on and off-site investigations to adapt the OWMC facility design to local conditions. Some refinements and modifications were made to the facility

TABLE 1.1

LINKAGE OF THE AGRICULTURAL STUDY TO OTHER PHASE 4B WORK

STUDY	ANALYST	RELATIONSHIP TO AGRICULTURAL STUDY
Social Impact	Institute of Environmental Research Inc. (IER)	- cooperative implementation of local community and access road interviews - IER provided operator age and farm/non-farm residence data - exchanged information on future scenario
Economic Impact	Morehouse Economic Planning Consultants	- Ecologistics provided Morehouse with data on estimated gross farm revenue and employment for on-site properties and within the local community - Morehouse provided Ecologistics with data on the extent of estimated property value impacts and opportunities for off-farm employment with OWMC - exchanged information on future scenarios
Transportation	M.M. Dillon Ltd.	- Ecologistics provided data on farm vehicle traffic to Dillon - Dillon provided calculations of agricultural vehicle impact indices and levels of increased noise along the access roads
Site Assessment	M.M. Dillon Ltd.	- Dillon provided overall direction and coordination regarding the site assessment process
Surface Water and Biology	Gartner Lee Associates Ltd. (GLAL)	- GLAL assessed impacts to downstream water users resulting from sewage and stormwater services
Air Dispersion of Pollutant Emissions and Dust	Ontario Research Foundation (ORF)	- ORF provided air emission and direct dispersion data

TABLE 1-1 - cont´d

LINKAGE OF THE AGRICULTURAL STUDY TO OTHER PHASE 4B WORK

STUDY	ANALYST	RELATIONSHIP TO AGRICULTURAL STUDY
Risk Assessment Eco-Risk	Environ	- Ecologistics provided several literature reviews documenting levels of air contaminants causing injury to crops and livestock. Environ provided an assessment of risk to crops and livestock
Engineering	Monenco Ltd.	- provided facility characteristics assumptions - identified location of site service corridors
Visual Impacts	EDA Collaborative Inc.	- EDA provided mapping of visual intrusion zones - jointly reviewed use of windbreaks as visual screens around the facility
Noise Impacts	S.S. Wilson (subconsultant to M.M. Dillon Ltd.	- Ecologistics provided location of barns to S.S. Wilson who in turn, provided noise contour mapping and specific noise levels at farm house and barn locations
Land Use	Leon Kentridge Associates Ltd.	- LKAL reviewed land use planning and future scenario information

design and operation plans. The Phase 4B reports by Monenco Limited (1987) provide detail on that work.

Information on proposed refinements to facility characteristics was provided to site assessment consultants for evaluation. Affected characteristics included:

- the location of site service corridors for electricity, sewage, stormwater, water supply and natural gas;
- the location of the site entrance;
- the alignment of the intersection of Schram and Silverdale Roads;
- landfill options (i.e. above-ground, conventional, shallow entombed);
- sequencing of landfill operations; and
- on-site placement of the incinerator or the evaporator stacks.

Ecologistics Limited contribution to the analysis is documented by OWMC (1988).

b) Existing Conditions

One of the requirements of the submission for hearings under the Ontario Environmental Assessment Act is documentation of existing conditions at the preferred site and surrounding area. That information establishes a baseline for identifying and evaluating the potential effects of the OWMC facility. The agricultural consultants undertook extensive data collection to describe the characteristics of agriculture on and surrounding the site. Primary data sources included interviews with farmers, windshield land use surveys, discussions with local, knowledgeable farmers, and meetings with marketing boards, provincial ministries and agencies. Secondary data came from census reports.

c) Future Conditions

Construction of the OWMC facility is expected to commence in the early 1990's and the facility is expected to be operational 18 months later. The facility is expected to have a lifespan of at least 20 years.

Throughout this period, environmental conditions will change. An attempt was made to anticipate changes that are likely to occur without the facility, notwithstanding inherent difficulties in making such predictions. Future agricultural conditions were predicted based on an analysis of past trends in land uses, population, land value, economy, and the relevant forces affecting each of these. Resulting future scenarios provided a baseline against which potential risks and impacts of the proposed facility were evaluated.

1.2.2 PREDICT AND INTERPRET RISKS, IMPACTS, AND IMPACT MANAGEMENT MEASURES

a) Predict Risks and Impacts

In the second step risks and potential impacts of the OWMC facility were predicted in light of the facility characteristics, including on-site mitigation measures, and the expected future environmental conditions without the OWMC facility.

Predictions were first made for each agricultural risk and impact factor without considering the offsetting effects of mitigation and compensation measures. As far as possible distinctions in risk and impact were made among preconstruction, construction, operations, decommissioning and closure periods, and between normal and upset conditions. Both direct and indirect impacts were identified. Sensitivity analyses were conducted for areas of uncertainty.

b) Interpret the Significance of Predicted Risks and Impacts

Following the risk and impact prediction exercise, the significance of predicted changes was evaluated. Only those judged to be significant were retained for further consideration. In the case of uncertainty about the significance of risks and impacts, further consideration was required.

c) Identify and Evaluate Mitigation and Compensation Measures

Once the significance of predicted risks and impacts was determined, measures to reduce the impacts were considered. Options for impact management (mitigation and compensation) were reviewed with OWMC for both individual and community risks and impacts, as well as for cumulative or collective risks and impacts. These measures were considered for the preconstruction, construction, operations, decommissioning and closure periods. The effectiveness of these impact management measures was assessed.

1.2.3 STEP 3 - IMPACT MANAGEMENT

a) Identify Monitoring Requirements and Contingency Measures

The need for on and off-site monitoring during preconstruction, construction, operations, decommissioning and closure periods was addressed during Phase 4B. Baseline agricultural information was collected throughout the data collection phase. As well, a crop and livestock biomonitoring protocol was prepared and an on-site crop biomonitoring test plot was established.

Contingency measures were identified for major aspects of facility operations. These consider both normal and upset conditions, and address all the various pathways by which individuals and the community could potentially be affected.

b) Formulation of Impact Management Strategy

An overall impact management strategy was formulated by OWMC during the final step of the Facilities Development Process. This strategy integrates the mitigation, compensation, monitoring and contingency planning measures. Ecologistics Limited contributed recommendations related to agriculturally-related risks and impacts.

c) Interpret Residual Risks and Impacts

Once impact management strategies were formulated, the site assessment consultants reviewed these relative to their own risk and impact predictions to identify residual risks and impacts.

1.3 DATA COLLECTION AND ANALYSIS

Data describing agricultural resources and activities and the farm community were collected for the site, the local community, the region and the access route (see Chapter 3 for a description of these study areas). Primary data sources were utilized whenever possible. The sources employed to describe agricultural conditions and concerns were a questionnaire survey of individual farm operators, windshield land use surveys, marketing boards, and discussions with local farmers, and agricultural commodity groups.

Secondary data sources were used to examine local and regional trends in agriculture. Data sources included 1966 to 1986 Census of Agriculture reports and the 1981 and 1986 Census of Population reports from Statistics Canada.

For a number of risk and impact factors, data were provided by other site assessment consultants listed in Table 1-1.

Literature reviews were conducted to assemble additional background technical information to assist in the Phase 4B analysis.

1.4 PUBLIC AND AGENCY CONTACTS

An important objective of the Phase 4B agricultural analysis was to obtain input directly from affected farmers about agricultural concerns and the appropriateness of various mitigation and compensation measures. Ecologistics Limited staff attempted to obtain this information from farmers farming land in the local agricultural community through a personal questionnaire survey and kitchen table meetings.

Meetings were also held with local agricultural commodity groups and public agencies, such as the Ministry of the Environment and the Ministry of Agriculture and Food, during the study process to:

- obtain input on factors, data sources and predicted impacts
- document concerns about risk to crops and livestock
- obtain input on consumer response to fear about food contamination
- review the description of existing conditions
- review the protocol for biomonitoring.

1.5 SCOPE AND LIMITATIONS OF THE ANALYSIS

The scope of the Phase 4B agricultural analysis is limited by the availability of data from fully comparable facilities on the nature and extent of the risks and impacts to agriculture that may arise from the operation of OWMC's facility. While direct impacts such as displacement, noise, dust and visual intrusion can be predicted with some degree of certainty, the potential to predict risks and indirect impacts on the surrounding agricultural community is more limited.

The assessment of risks and impacts must encompass the life span and post-operational period of the OWMC facility. It is not possible to accurately forecast future agricultural conditions over this period. These will be determined by diverse developments in the agricultural community of West Lincoln as well as by conditions at the regional, provincial, national and international levels. Therefore, a future scenario is postulated that reflects recent trends and potential future developments that seem reasonable at this time.

A data set was compiled on existing agricultural conditions from interviews with study area farmers; however, forty-four percent of farmers in the local community declined to participate in the Phase 4B questionnaire survey. Despite this gap in primary data, the agricultural consultants developed a comprehensive description of present agricultural conditions and concerns. Information from windshield surveys, discussions with local farmers and marketing boards, the 1986 Census of Agriculture and the Ministry of Revenue Assessment Rolls was used to supplement the interview data. The resulting descriptions were reviewed, corrected and validated by several area farmers. Expressions of concern were augmented by discussions with farm operators at drop-in centres and kitchen table meetings.

As a result of the various information gathering and verification exercises, the data assembled for use in Phase 4B are considered adequate for the risk and impact analysis.

1.6 REPORT ORGANIZATION

Remaining sections of this report comprise the following chapters:

Chapter 2 - Approach to the Impact Assessment
Identifies facility operating assumptions, as well as impact factors, impact zones and time horizons

Chapter 3 - Study Methods
Describes study areas, data collection procedures, impact prediction procedures and impact severity assessment criteria

Chapter 4 - Existing Conditions
Provides an overview of agriculture in Niagara Region and in West Lincoln Township, and describes the agricultural characteristics of the local community, the preferred site and the preferred access route

Chapter 5 - Future Scenario for Agriculture
Examines the forces affecting the future of agriculture in the study area and presents a future scenario used for purposes of impact analysis

Chapter 6 - Comparable Facilities
Reviews the impacts of comparable, large-scale facilities on agricultural resources, and examine the management of those impacts

Chapter 7 - Predicted Impacts Without Compensation/Mitigation
Analysis of agricultural impacts and their significance

Chapter 8 - Impact Management and Residual Impacts
Identifies impact management programs and policies and determines their effectiveness in mitigating agricultural impacts

Chapter 9 - Monitoring and Contingency Measure Recommendations
Recommends and provides a rationale, for measures to address contingencies and outstanding uncertainties about facility effects

CHAPTER 2

APPROACH TO THE IMPACT ASSESSMENT

2.1 INTRODUCTION

This chapter provides a broad outline of the approach used in evaluating risks and impacts to agriculture. The following section on framework and assumptions describes the context within which impact factors were defined. Facility characteristics, impact zones and planning horizons are covered in this section. Next is an outline of the risk and impact factors used in Phase 4B and a rationale for each. These are then compared to the factors and indicators used in Phases 4A and 3B.

2.2 FRAMEWORK AND ASSUMPTIONS

2.2.1 FACILITY CHARACTERISTICS

This section summarizes facility characteristic assumptions that were employed in the agricultural impact analysis in Phase 4B. Assumptions, provided in Table 2.1 are based on the Phase 4B engineering reports (Monenco, 1987; OWMC, 1988).

TABLE 2.1

FACILITY CHARACTERISTIC ASSUMPTIONS FOR PHASE 4B AGRICULTURAL IMPACT ANALYSIS

Construction

- all on-site properties acquired and all on-site activities displaced
- 18 month schedule
- normal work week with no overtime
- average labour force of 360, peaking at 600 from months 10 to 16
- no construction camps; labour will commute to the site
- dust emissions to be generated during earth moving operations and subsequent on-site vehicle movements; permanent on-site road beds will be built and dust suppressants used to limit dust
- earth moving will be controlled and disturbed areas revegetated to minimize erosion
- initial site work to include fencing and drainage
- noise will be typical of a construction site with peak noise occurring during the earth moving phase lasting 8 to 12 weeks

Start Up and Operation

- 20 year minimum facility lifetime
- initial facility capacity of 150,000 t/a of waste inputs with capability to expand to 300,000 t/a (unless otherwise noted, impacts are assessed for 300,000 t/a)
- facility components will include incineration plant, physical-chemical treatment plant, solidification plant, engineered landfill, laboratory, administration building, and other buildings, including storage areas, traffic areas, etc.
- three stacks will be present on-site - incinerator stack (60 m), auxillary boiler stack (30 m), and the evaporator stack (45 m)
- a technical buffer zone around the central operating area and a 50 m buffer zone around the landfill will be maintained
- the perimeter and central operating area will be fenced with 3 m high chain link fence topped with 3 strands of barbed wire

TABLE 2.1 - cont'd

FACILITY CHARACTERISTICS ASSUMED FOR PHASE 4B AGRICULTURAL IMPACT ASSESSMENT

- the site will be surrounded on three sides by an undulating berm (2 to 5 m in height) just inside the perimeter fence
- shallow entombed landfilling with revegetation on completed areas will be established
- central operating area and roadways will be lit all night with downward focused light while the incinerator stack lit is to have red lights visible from any direction
- employment of 151 when treating an initial capacity of 150,000 t/a; employment of 221 at 300,000 t/a
- hours of operation:
    - incineration plant - 3 shifts/day (24 hr/day) and 7 days/week or 7000 hrs/year
    - physical-chemical treatment plant and solidification plant -
        - initially a single shift/day, 5 days/week, 50 weeks/year
        - increased capacity will be handled by additional shifts (up to 3 shifts/day)
    - landfill operations - daylight hours, 5 days/week, 50 weeks/year
- routine atmospheric emissions will originate from the incinerator and the evaporator; various fugitive emissions will also occur and upset conditions will produce acute emission episodes
- dust emissions will be generated by traffic and by handling of clay and soil at the landfill operations, however, dust control measures will be put in place to minimize emissions
- site services include a surface drainage system, water supply (potable and raw), natural gas, electricity and telephone; most services will be buried in existing road allowances, sanitary sewage will be trucked off-site to a local sewage plant

2.2.2 IMPACT ZONES[1]

The agricultural analysis considers risks and impacts to the agricultural resource base, to farms and their operators and to the general farm economy and community. These risks and impacts are differentiated on the basis of their location relative to the site using a series of impact zones. The impact zones are shown on Figure 2.1.

The local community impact zone coincides with the eastern portion of the former Gainsborough Township; the boundaries are Regional Road 24 on the east, the Welland River on the south, Regional Road 27 and Highway 20 on the west and to the north the concession road on the northern perimeter of the former Gainsborough Township. Rationale for establishment of boundaries for the local community are provided by IER (1988).

Within the local community are three discrete zones. The first is the site itself where the residents and activities will be displaced. This occupies Lot 18 and the east half of Lot 17, Concession 3, West Lincoln Township. It is bounded to the north, east and south respectively by Highway 20, Schram Road and Vaughan Road (see Figure 2.1).

The second zone, the direct impact zone (also outlined in Figure 2.1), includes properties surrounding the site that will be subject to cumulative direct impacts such as noise, dust and visual intrusion. The rationale for inclusion of properties in the direct impact zone is provided by OWMC (1988).

The third zone within the local community encompasses the area lying beyond the direct impact zone. It is an area in which indirect impacts will be predominant, and the zone is accordingly called the indirect impact zone.

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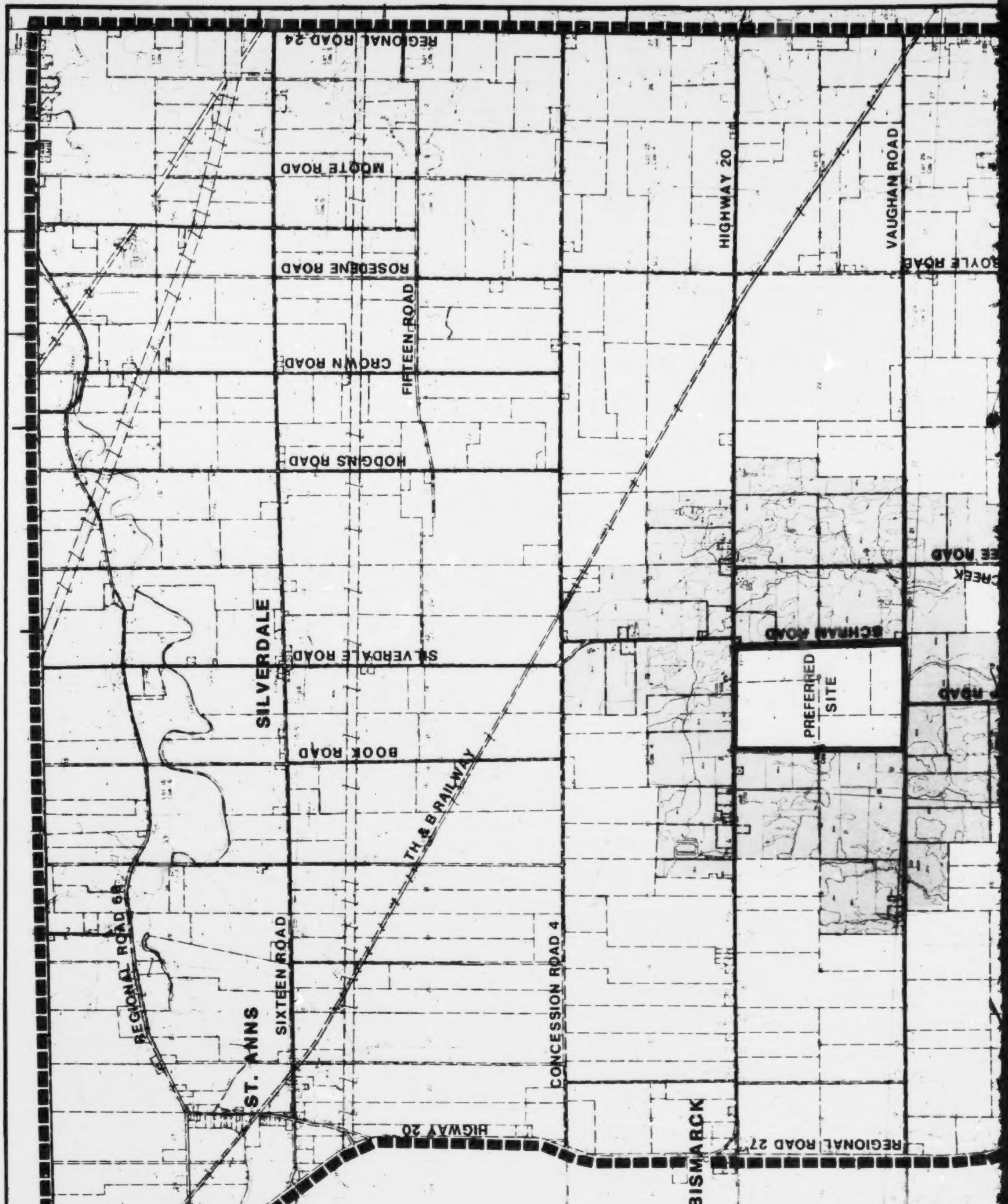
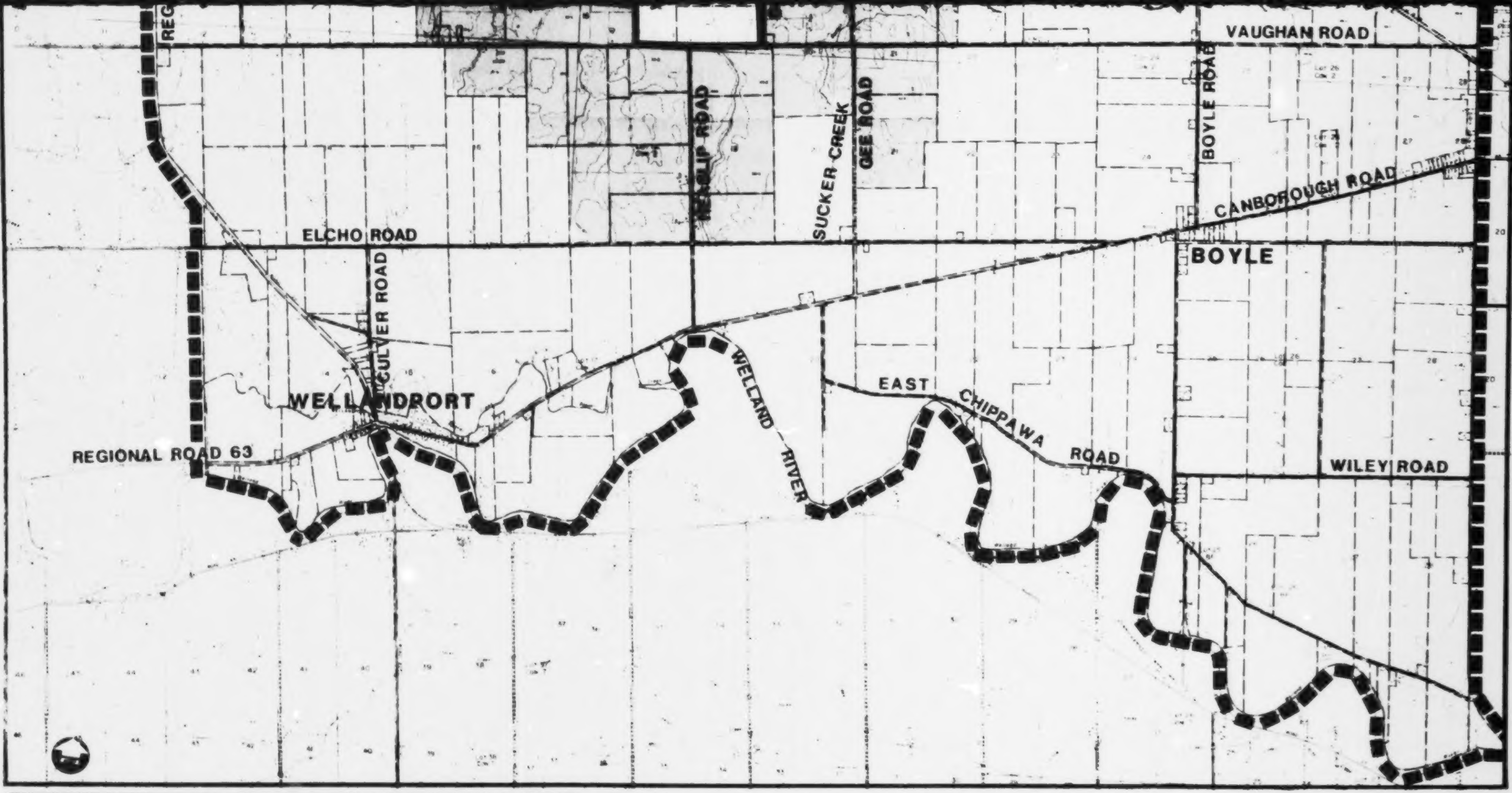
[1] In addition to impact zones used in the prediction of risks and impacts, there are a number of study areas that correspond to data collection efforts. These are described in Chapter 3.


REGIONAL ROAD 24
MOOTE ROAD
HIGHWAY 20
VAUGHAN ROAD
ROSEDENE ROAD
OYLE ROAD
FIFTEEN ROAD
CROWN ROAD
HODGINS ROAD
EE ROAD
CREEK
SCHRAM ROAD
SILVERDALE ROAD
SILVERDALE
PREFERRED SITE
ROAD
BOOK ROAD
TH & B RAILWAY
REGIONAL ROAD 69
SIXTEEN ROAD
CONCESSION ROAD 4
ST. ANNS
BISMARCK
HIGWAY 20
REGIONAL ROAD 27
PATTERSON ROAD


REG
VAUGHAN ROAD
BOYLE ROAD
HEASLIP ROAD
SUCKER CREEK
GEE ROAD
CANBOROUGH ROAD
ELCHO ROAD
BOYLE
CULVER ROAD
WELLANDPORT
REGIONAL ROAD 63
WELLAND RIVER
EAST CHIPPAWA ROAD
WILEY ROAD

Ontario
Waste Management
Corporation

500 0 1000 2000 m

Consultant:

ecologistics limited

AGRICULTURAL IMPACT ZONES

Figure 2.1

Legend:

— Preferred Site Boundary

▭ Direct Impact Zone

▭ Indirect Impact Zone

■■■■■■ Local Community Impact Zone Boundary

— - — - Property Ownership Boundary

The final impact zone depicted in Figure 2.1 and in more detail in Figure 2.2 is the corridor of properties abutting the preferred access route. This route extends 16 km south from the QEW on Regional Road 24, then west 5 km on Highway 20 to Schram Road. Direct impacts will dominate in this zone.

Apart from these zones, a regional impact zone, coinciding with the Regional Municipality of Niagara is used in discussions of certain risk and impact factors.

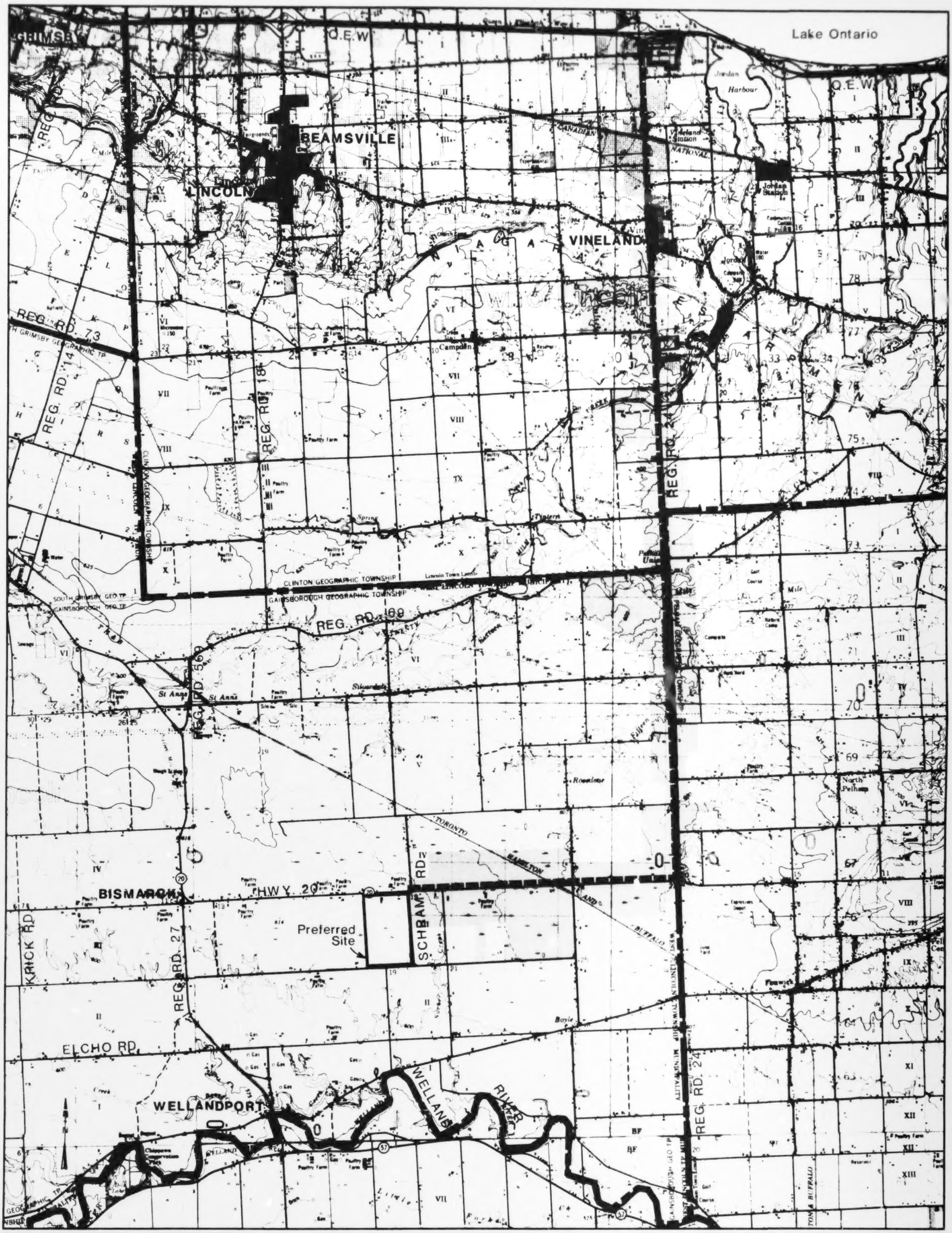
2.2.3 TIME HORIZONS

A number of time horizons were considered in the analysis. These are outlined in Table 2.2 along with comments on their significance to the analysis.

2.3 RISK AND IMPACT FACTORS

Factors represent distinct types of risk or impact that are expected to result from changes in existing and future conditions caused by the OWMC facility and its operation. Of interest are those which have a significant bearing on the well-being of individuals and the agricultural community, affect the productivity of agricultural resources, and are of consequence from the point of view of existing public policies and programs such as municipal official plans or Provincial farmland protection objectives.

The selection of factors for the Phase 4B agricultural analysis took into account the goals and objectives of the site assessment process, characteristics of the site, the adjacent agricultural community and the


Lake Ontario
GRIMSBY
Q.E.W.
Jordan Harbour
BEAMSVILLE
LINCOLN
VINELAND
Jordan Station
CANADIAN NATIONAL
REG. RD. 73
SOUTH GRIMSBY GEOGRAPHIC TP
REG. RD. 14
REG. RD. 18
REG. RD. 24
Campden
CLINTON GEOGRAPHIC TOWNSHIP
GAINSBOROUGH GEOGRAPHIC TOWNSHIP
Lincoln Town Limits
REG. RD. 69
REG. RD. 569
St Anns
TORONTO HAMILTON AND BUFFALO
BISMARCK
HWY. 20
SCHRAM RD
Preferred Site
KRICK RD
REG. RD. 27
ELCHO RD
WELLANDPORT
WELLAND RIVER
North Pelham
Fenwick
Boyle
WEST LINCOLN TOWNSHIP MUNICIPALITY
Poultry Farm

OWMC Ontario Waste Management Corporation

1000m 0 1 2 3 4 km

Consultant:

ecologistics limited

PREFERRED ACCESS ROUTE

Figure 2.2

Legend

━━━	Preferred Site
▬ ▬ ▬	Access Route
▭	Abutting Properties

Source: Ministry of Revenue Assessment (1985) and the 1986 Farm Survey.

TABLE 2.2

TIME HORIZONS USED IN THE PHASE 4B ANALYSIS

PERIOD	DURATION	SIGNIFICANCE
Pre-Construction	includes pre-hearing, hearing and baseline monitoring stages	documentation of existing conditions and collection of baseline data for monitoring
Construction	18 month construction schedule	impacts related to nuisance impacts of the construction activity, and influx of construction workers; on-site displacement occurs at the start of the period
Operations	initial operational phase	impacts due to nuisance and risk factors from facility activity and access road use
Future Conditions	operating life of the facility (minimum 20 years)	forecasts of changes in conditions with and without the facility
Decomissioning and Closure	in perpetuity	post-closure land use, ongoing impact of risk factors

Source: Adapted from OWMC 1988.

preferred access roads, concerns raised through meetings and interviews with area residents and with agencies.

The factors are also based on facility characteristics including the site size, layout and design, facility construction and operation activities, truck traffic volumes, employment levels, atmospheric emissions, and off-site servicing requirements.

Agricultural risk and impact factors are outlined in Table 2.3. A general description and rationale is provided for each. More specific information on each factor and its associated indicators is provided in Table 2.4.

Each factor encompasses a related set of potential impacts within a specific impact zone. The factors address both direct impacts such as displacement of a farm and indirect effects such as the loss of agribusiness customers or community group members if farmers decide to leave the area.

Farm operators are potentially directly affected by several of the factors such as displacement, nuisance effects, traffic effects which result from facility-related causes like land acquisition, visual intrusion, noise and off-site emissions. Other indirect factors address changes that arise as consequences of direct facility effects; for example, certain farmers may decide to leave because of nuisance effects or concerns over emissions. This in turn may have secondary impacts on agribusiness and community networks. The interrelationship of risk and impact factors and indicators is illustrated in Figure 2.3.

The Phase 4B factors relate directly to those used in earlier phases of the site selection process. The correspondence of factors is illustrated in Table 2.5. The principal departure from the Phase 4A and

TABLE 2.3

AGRICULTURAL RISK AND IMPACT FACTORS - DESCRIPTION AND RATIONALE

FACTOR	DEFINITION	RATIONALE
Farm Displacement	- total displacement of farms - the number and characteristics of farm units with headquarters on-site which will be displaced by the facilities	- individual farm businesses are the basic unit of the local and regional agricultural economy. The displacement of farm units reduces farm production in the local area and erodes its agricultural character
	- partial displacement of farms with off-site headquarters - the size and use of the on-site property relative to the total farm operation	- any significant loss of a farm's land base will disrupt operations and potentially increase operating costs or decrease the efficiency of operations
Loss of Farm Land	- the area and capability of lands to be displaced by the site facilities and the Schram Road realignment	- land will be permanently lost to agriculture if the facility is built. Preservation of good agricultural land is the goal of the Provincial Foodland Guidelines. This conflict must be addressed wherever agricultural land is to be used for non-agricultural purposes
Farm Family/ Farm Operator Impacts	- the impacts to farm families due to direct effects of noise, dust visual exposure, traffic interference; implications of cumulative effects of stress, aggravation, loss of amenity and perceived change in the quality of life and risk to human health	- the operation of a waste treatment facility is frequently considered to be an incompatible use of land where agriculture predominates. This can result in real and perceived effects on the rural environment and consequently on the quality of life of farm families. This, in turn, may be detrimental to agriculture if impacted families are less able to or less willing to maintain their farm operations as a result of such impacts

TABLE 2.3 - cont'd

AGRICULTURAL RISK AND IMPACT FACTORS - DESCRIPTION AND RATIONALE

FACTOR	DEFINITION	RATIONALE
Farm Productivity Impacts	- the risk of contamination or other damage to crops, livestock or farmland	- contamination or other damage to farm products could affect marketability of those products and/or product prices with consequent impacts on farm incomes. Any contamination of the land base could have a similar but more significant long-term effect
Farm Business Impacts	- impacts on farm businesses due to direct effects of noise, dust, visual exposure and traffic interference on the efficiency of farm operations; land value changes and potential loss of product sales due to adverse customer perceptions; improvements in services	- any impacts that reduce the ability of farm operations to function efficiently, to achieve reasonable levels of productivity or to deal effectively in produce and financial markets can result in a direct loss of farm income and pose a risk to farm viability
Agricultural Community Impacts	- community level changes reflecting the effect of impacts at several levels in the study area; includes in- and out-migration, erosion of community networks, changes in off-farm employment and general changes in the character of the farm community	- various changes at the community level can detract from the quality of life of farm operators and weaken the formal and informal community networks that support farming activity
Agribusiness Impacts	- loss of agribusiness sales due to out-migration of farm operations	- enterprises in agribusiness form part of the infrastructure that supports agriculture. Any erosion of agribusiness due to loss of sales will in turn adversely affect remaining farm operations in the community

TABLE 2.4

AGRICULTURAL IMPACT FACTORS AND INDICATORS

ZONE	FACTOR	INDICATOR	DESCRIPTION
Site	Farm Displacement	- Total Displacement of Farms	- the number and characteristics of farm units with headquarters on-site which will be displaced by the facilities
	Loss of Farm Land	- - -	- the area and capability of lands to be displaced by the site facilities
Local Community	Farm Displacement	- Partial Displacement of Farms	- on-site properties described in terms of size and use relative to toal farm operation
	Farm Family/Farm Operator Disruption	- - -	- exposure to critical levels of dust, noise, and visual intrusion - attitudes and perceptions related to nuisance effects
	Farm Productivity Impacts	- Exposure to Nuisance Effects	- actual and perceived risk of damage to crops, damage to crops or livestock due to noise, dust, etc.
		- Atmospheric Emission Effects	- actual and perceived risk of damage to crops, livestock or farm land from contamination
		- Downstream Agricultural Activity	- actual and perceived risk of damage to crops, livestock or land from contamination
	Farm Business Impacts	- Decrease in Property Value	- estimated loss of value of farm properties
		- Loss of Product Sales	- potential loss of sales due to consumer reluctance to purchase locally grown products
		- Local Services	- impacts on farms due to site servicing

TABLE 2.4 - cont´d

AGRICULTURAL IMPACT FACTORS AND INDICATORS

ZONE	FACTOR	INDICATOR	DESCRIPTION
	Agricultural Community Impacts	- Out-Migration of Farm Operators	- estimated gross and net loss of farm operations in terms of number of farms, income and employment
		- Non-Farm In-Migration	- occupancy of farm properties by new non-farm residents
		- Erosion of Community Networks	- impacts of out-migration on farm associations and informal relationships between farm operators
		- Off-Farm Employment with OWMC	- impact of farmers who take off-farm employment with OWMC to supplement farm income
		- Change in Local Agricultural Character	- changes in types of farms, farm sizes and other variables that could result from out- and in-migration, loss of sales, off-farm work, etc.
	Agribusiness Impacts	- - -	- loss of agribusiness sales due to out-migration of farm operators
Access Roads	Loss of Farmland	- - -	- area and capability of land lost due to realignment of Schram and Silverdale Roads
	Farm Family/Farm Operator Disruption	- - -	- exposure to noise and other nuisance effects along access roads - attitudes and perceptions related to nuisance effects

TABLE 2.4 - cont'd

AGRICULTURAL IMPACT FACTORS AND INDICATORS

ZONE	FACTOR	INDICATOR	DESCRIPTION
	Farm Productivity Impacts	- Exposure to Nuisance Effects	- actual and perceived risk of damage to crops or livestock due to noise, dust, etc.
		- Interference with Farm Vehicles	- potential conflict of road use as reflected in relative levels of OWMC traffic and farm traffic - attitudes and perceptions related to traffic interference
		- Access Road Risk	- actual and perceived risk of damage to crops, livestock or farm land due to contamination
Region	Farm Productivity Impacts	- Atmospheric Emission Effects	- actual and perceived risk of damage to crops, livestock or farm land due to contamination

FIGURE 2.3 OWMC FACILITY - INTERRELATIONSHIP OF AGRICULTURAL RISK AND IMPACT FACTORS AND INDICATORS

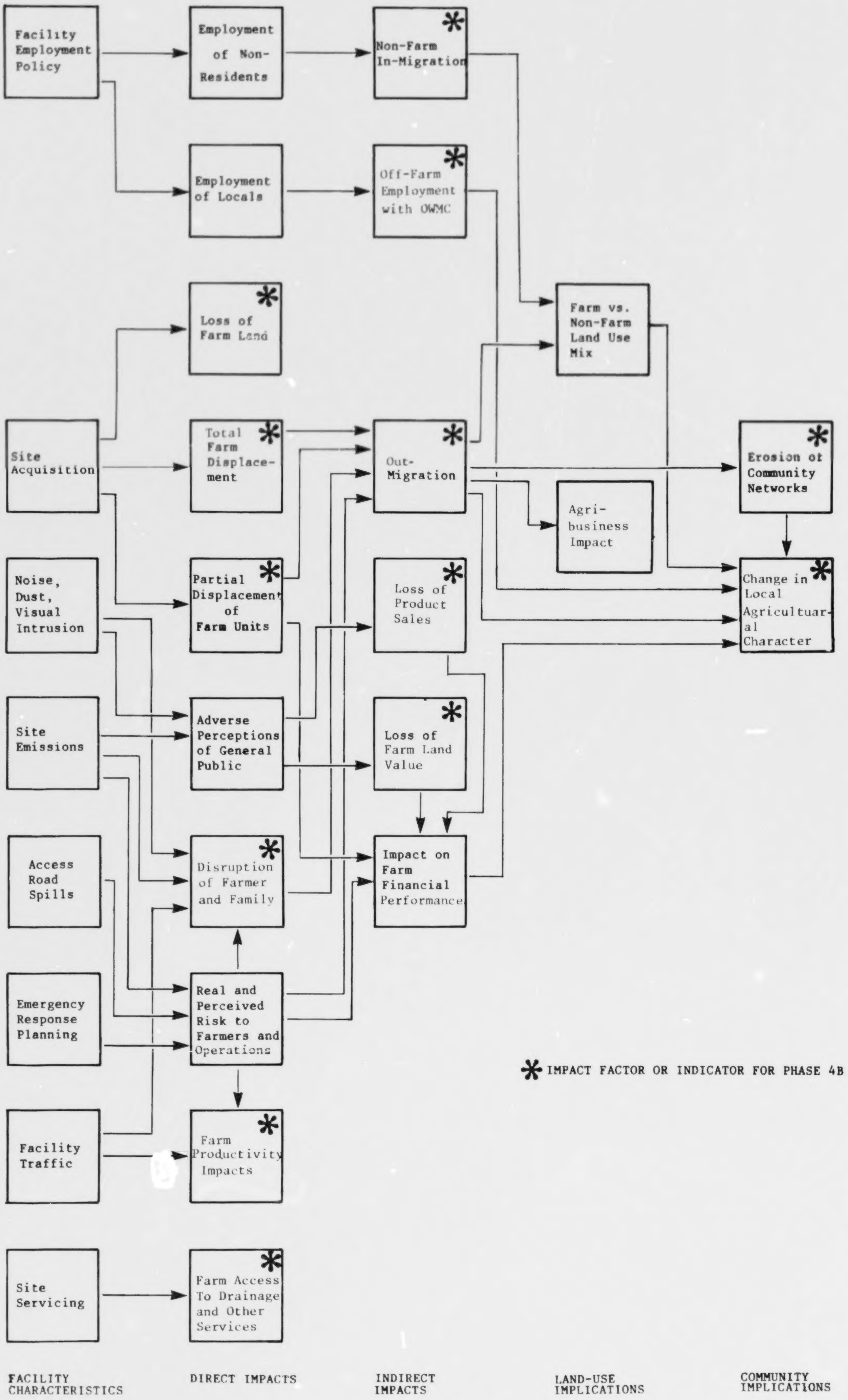

Facility Employment Policy
Employment of Non-Residents
* Non-Farm In-Migration
Employment of Locals
* Off-Farm Employment with OWMC
* Loss of Farm Land
Farm vs. Non-Farm Land Use Mix
Site Acquisition
* Total Farm Displacement
* Out-Migration
* Erosion of Community Networks
Agri-business Impact
Noise, Dust, Visual Intrusion
* Partial Displacement of Farm Units
* Loss of Product Sales
* Change in Local Agricultural Character
Site Emissions
Adverse Perceptions of General Public
* Loss of Farm Land Value
Access Road Spills
* Disruption of Farmer and Family
Impact on Farm Financial Performance
Emergency Response Planning
Real and Perceived Risk to Farmers and Operations
* IMPACT FACTOR OR INDICATOR FOR PHASE 4B
Facility Traffic
* Farm Productivity Impacts
Site Servicing
* Farm Access To Drainage and Other Services
FACILITY CHARACTERISTICS
DIRECT IMPACTS
INDIRECT IMPACTS
LAND-USE IMPLICATIONS
COMMUNITY IMPLICATIONS

TABLE 2.5

CORRESPONDENCE OF FACTORS IN PHASES 4B, 4A AND 3B

ZONE	PHASE 4B		PHASE 4A		PHASE 3B FACTOR
	FACTOR	INDICATOR	FACTOR	INDICATOR	
On-Site	Farm Displacement	- Total Displacement of Farms	Displacement of Farms with On-Site Headquarters	. no. of farms with on-site headquarters . average size of farms . estimated gross farm revenue	. farm building complexes
	Loss of Farmland	- - -	Loss of Farmland	. soil capability . tile drainage	. soil capability
Local Community	Farm Displacement	- Partial Displacement of Farms	Partial Displacement of Farms	. no. of farm operations affected . average size of lost parcels . proportion of land base lost	. farm building complexes
	Farm Family/Farm Operator Disruption	- Exposure to Nuisance Effects	Disruption of Adjacent Farm Operations	. no. of farm operations with headquarters . no. of operators with owned land . livestock density	. farm building complexes . livestock densities
			Disruption of Non-Adjacent Farm Farm Operations	. no. of farm operations with headquarters . proportion of non-adjacent vicinity in crops . livestock densities	. farm building complexes . livestock densities

TABLE 2.5 - cont'd

CORRESPONDENCE OF FACTORS IN PHASES 4B, 4A AND 3B

ZONE	PHASE 4B		PHASE 4A		PHASE 3B FACTOR
	FACTOR	INDICATOR	FACTOR	INDICATOR	
	Farm Productivity Impacts	- Exposure to Nuisance Effects	(no comparable factor)		(no comparable factor)
		- Atmospheric Emission Effects	Disruption to the Farm Economy	. relative exposure of crops and livestock to fugitive emissions . relative exposure of crops and livestock to stack emissions	. sensitive crops
		- Downstream Agricultural Activity	Disruption to the Farm Economy	. exposure of downstream livestock	
	Farm Business Impacts	- Decrease in Property Value	(no comparable factor)		(no comparable factor)
		- Loss of Product Sales		. gross farm revenue	
		- Local Services	(no comparable factor)		(no comparable factor)
	Agricultural Community Impacts	- Out-Migration of Farm Operators	Stability of Farm Population	. age of operators . full-time operators (percent of total operators)	

TABLE 2.5 - cont´d

CORRESPONDENCE OF FACTORS IN PHASES 4B, 4A AND 3B

ZONE	PHASE 4B		PHASE 4A		PHASE 3B FACTOR
	FACTOR	INDICATOR	FACTOR	INDICATOR	
	Agricultural Community Impacts	- Non-Farm In-Migration	Stability of Land Base	. land tenure . farm residences (percent of total residences)	. land fragmentation
				. agriculturally designated land	. designated land use
				. private land ownership	. publicly owned land
		- Erosion of Community Networks	(no comparable factor)		(no comparable factor)
		- Off-Farm Employment with OWMC	(no comparable factor)		(no comparable factor)
		- Change in Local Agricultural Character	(no comparable factor)		(no comparable factor)
	Agribusiness Impacts	- - -	(no comparable factor)		(no comparable factor)
Access Roads	Loss of Farm Land	- - -	(no comparable factor)		(no comparable factor)
	Farm Family/Farm Operator Disruption	- - -	(no comparable factor)		(no comparable factor)

TABLE 2.5 - cont´d

CORRESPONDENCE OF FACTORS IN PHASES 4B, 4A AND 3B

ZONE	PHASE 4B		PHASE 4A		PHASE 3B FACTOR
	FACTOR	INDICATOR	FACTOR	INDICATOR	
	Farm Productivity Impacts	- Exposure to Nuisance Effects	(no comparable factor)		(no comparable factor)
		- Interference with Farm Vehicles	Disruption to Farm Traffic and Cattle Crossings	. local roads . regional roads	
		- Access Road Risk	Disruption to Crop and Livestock Production	. adjacent crops . adjacent livestock	. sensitive crops . livestock populations
				. downstream livestock	
Region	Farm Productivity Impacts	- Atmospheric Emission Effects	Disruption to the Farm Economy	. relative exposure of crops and livestock to fugitive emissions . relative exposure of crops and livestock to stack emissions . exposure of downstream livestock	(no comparable factor)

3B factors is that the Phase 4B factors focus on the degree to which receptors are exposed to change and the significance of this exposure. This has resulted in an analysis that is more detailed and that outlines cause-effect relationships more fully.

Factors used by different OWMC consultants were, as in other phases, closely related. The agricultural factors link with many of the social and economic factors. Certain data describing agricultural risk factors were provided by the transportation and risk assessment consultants.

CHAPTER 3

STUDY METHODS

3.1 INTRODUCTION

In Chapter 2, the general approach to impact analysis was described. This chapter explains how this approach was implemented. The first section describes areas used in the data collection tasks. This is followed by a discussion of data collection methods, including an evaluation of the representativeness and the limitations of primary data collected from the study area. Impact prediction procedures are then outlined. The final section deals with the synthesis and evaluation of these predictions.

3.2 STUDY AREAS

Study areas are areas within which specific data collection tasks were conducted. They correspond to certain of the impact zones outlined in Chapter 2; specifically, the following impact zones also served as study areas:

Site
Local Community
Access Route
Region

Boundaries for these areas are delineated and explained in Section 2.2.2.

3.3 DATA COLLECTION

3.3.1 OVERVIEW OF DATA REQUIREMENTS AND DATA SOURCES

Since the Phase 4B analysis was to provide a prediction of specific risks and impacts, it was necessary to utilize more primary data than the previous phases. Sources of primary data for Phase 4B are:

- a questionnaire survey of farm operators,
- a windshield land use survey,
- meetings with farm operators, and
- discussions with agricultural marketing boards, agencies and commodity groups.

Data from these sources were supplemented with primary data collected during Phase 4A and with data from the 1986 Census of Agriculture and the Census of Population. In addition, information on comparable facilities was compiled and literature reviews were conducted to assemble available technical information. These data collection efforts are reviewed below.

3.3.2 PHASE 4B QUESTIONNAIRE SURVEY OF FARM OPERATORS

Interviews with farm operators were conducted in the summer of 1986. Current data were collected about farm operations and farm operator concerns about the proposed OWMC facility. The interviews were undertaken in conjunction with a social impact survey by IER. Appendix A-1 contains a copy of the complete "Socio-Economic Impact Survey" form utilized by the two firms and explains procedures followed in contacting and interviewing farmers, and in checking and coding the data.

The interviews took place within the Local Community study area.

3.3.3 ACCESS ROAD QUESTIONNAIRE SURVEY OF FARM OPERATORS

Interviews were carried out with farm operators with farm lands abutting that section of the proposed access road, Regional Road 24, located outside the local community. Conducted in conjunction with IER, the survey was intended to collect information on the existing use of the road for farm and non-farm activities, adjacent agricultural land uses, and concerns about the possible effects of OWMC-related traffic. A description of the questionnaire and the interviewing procedures appears in Appendix A-2.

3.3.4 WINDSHIELD LAND USE SURVEYS

Windshield surveys were undertaken to collect information on agricultural land uses for properties in the Local Community used by farmers who declined to complete a questionnaire survey form. In August 1986, Ecologistics Limited staff mapped, from the roadside, crops, other agricultural land uses, farm headquarters and type of barn for the properties in question. The survey procedures are documented in Appendix B.

3.3.5 MEETINGS WITH FARM OPERATORS

Discussions were held with a number of farmers during the study process to:

- obtain comments on the completeness and accuracy of the description of existing conditions; and
- obtain comments on the predicted impacts and mitigation or compensation measures proposed by OWMC.

Comments on the existing conditions description were provided by five farmers who are knowledgeable about agriculture in the local area. A draft report on existing conditions was provided to each farmer. An Ecologistics Limited consultant, accompanied by an OWMC staff person, discussed the contents of this report with each farmer. Comments and questions were followed up by the consultant. A revised report was forwarded to each of the farmers in February, 1987.

In August, 1987, O.M.A.F. completed their review of the existing conditions description; their comments were incorporated into the report.

3.3.6 MEETINGS WITH REGULATORY AGENCIES AND AGRICULTURAL MARKETING BOARDS AND FOOD PROCESSORS

Contacts with regulatory agencies and agricultural marketing boards and food processors are being made to develop response mechanisms relative to specific consumer concerns about health risks associated with agricultural produce from the area. Requirements for an on-going information program are being reviewed. Since these meetings are in progress the findings cannot yet be summarized herein.

3.3.7 LITERATURE REVIEWS

A number of literature reviews were undertaken in Phase 4B to obtain a variety of technical information related to risks and impacts. These are described in Table 3.1.

3.3.8 COMPARABLE FACILITIES

Several industrial facilities were investigated to determine the nature of agricultural impacts in their environs and to identify impact management procedures that were in use. The majority of information was obtained by

TABLE 3.1

OUTLINE OF PHASE 4B LITERATURE REVIEWS

TITLE OF REVIEW	PURPOSE
Crop Sensitivity to Foliar Uptake of Air Contaminants	- to document evidence of plant effects, economic damage, most sensitive plants, and air quality standards for atmospheric contaminants - undertaken primarily during Phase 4A study period, but findings are complementary to those reported in Phase 4B study of plant response to contaminants in soil (see below)
Crop Sensitivity to Uptake of Contaminants from Soil	- to document crop uptake, bioaccumulation, and potential phytotoxicity of hazardous contaminants entering the plant via the soil - examines fate of contaminant in soil, and documents published contaminant standards for soil - complements the above-noted review of foliar uptake of air contaminants undertaken during Phase 4A
Livestock Sensitivity to Air Contaminants	- review of key literature dealing with the sensitivity of domestic livestock to hazardous contaminants - coverage of each contaminant included toxicity, symptoms and effects, metabolic fate, and dose-response relationships. Available standards or maximum tolerable levels of contaminants in food products from livestock were also noted.
Review of Socio-Economic Procedures to Monitor Project Impacts on Agricultural Communities	- to summarize and evaluate socio-economic monitoring procedures documented in the literature; background for the identification of key socio-economic indicators of change likely to be evident in the farm community and agricultural economy as a result of facility impacts - input to the design of a monitoring program to measure long-term socio-economic impacts on the community

TABLE 3.1 - cont'd

OUTLINE OF PHASE 4B LITERATURE REVIEWS

TITLE OF REVIEW	PURPOSE
Biological Monitoring Procedures for the Assessment of Air Pollutant Effects	- to determine the status of biomonitoring as a research and management tool in assessing the impacts of environmental contaminants on agricultural ecosystems - input to program design for biomonitoring using both plants and animals
Consumer Response to Environmental Contamination of Food	- to investigate consumer perceptions, attitudes, and purchase behaviour relating to food grown and/or sold in the vicinity of a known or suspected source of environmental contamination

reviewing available literature and interviewing agency personnel or other individuals familiar with facility effects. Personal interviews were conducted with neighbouring farmers at one of the facilities (Tricil).

3.3.9 USE OF PHASE 4A DATA

Most of the information about agricultural activity within the study area was obtained from the Phase 4B (1986) questionnaire surveys. Where farmers declined to be interviewed, relevant information was drawn from the Phase 4A (1984) data base. These data include:

- the type and number of livestock and poultry reported in the Phase 4A questionnaires and the 5 km livestock inventory; and
- livestock and poultry quota information collected from Agricultural Marketing Boards (for areas beyond 5 km).

Information collected in Phase 4A describing use of the access roads by farm vehicles formed the basis for the Phase 4B access road data collection. Information reported by farm operators who did not return a questionnaire in Phase 4A but completed one in Phase 4B was combined with the earlier data to complete the data base. Appendix D contains a description of the procedures followed in compiling these data sets.

3.3.10 CENSUS DATA

Data in the Census of Agriculture and the Census of Population (1966-1986) were obtained from Statistics Canada for the following tasks:

- a description of existing conditions (Chapter 4);
- an analysis of trends for the future scenario work (Chapter 5); and

- verification of the representativeness of the questionnaire data (Section 3.4.3).

Census data are summarized in Appendix C.

3.4 IMPACT PREDICTION PROCEDURES

3.4.1 OVERVIEW

In general the following steps were followed in developing the predictions of risk and impact for each factor:

- data analysis
- data verification
- projection of future conditions
- development of impact scenarios
- sensitivity analysis

Not all steps were relevant for all factors. Each of these steps is reviewed below.

3.4.2 DATA ANALYSIS

Data analysis tasks are outlined in Table 3.2. Summary statistics generated from the 4B questionnaire data were used in the assessment of various risks and impacts. Soil capability data are relevant to loss of farm land while employment and income calculations relate to the analysis of out-migration potential.

3.4.3 DATA VERIFICATION

The intent of the Phase 4B questionnaire survey was to achieve complete coverage of farm operators living in and/or operating within the local

TABLE 3.2

SUMMARY OF DATA ANALYSIS TASKS

TASK	INPUT DATA	METHOD	OUTPUTS
Summary Statistics	Phase 4B Questionnaire Data	- computer programs were developed to compile and analyse data	- frequency counts and percent frequencies by type of response - cross-tabulation of responses
Soil Capability for Agriculture	Phase 4A on-site soil map and OIP soil map for West Lincoln Township	- rating of soil units based on Ontario Institute of Pedology criteria for the Canada Land Inventory	- areas by soil capability class for farm land taken out of production on-site and for Schram Road realignment
Estimation of Gross Farm Revenue	- crop and livestock production and sales data from Phase 4B and 4A questionnaires - quota information from agricultural marketing boards - windshield survey data on crops and livestock - statistics on productivity and prices for products from OMAF	- product sales based on reported figures or estimated from crop acreages and livestock populations - revenues based on product sales and representative product prices - allowances made for crops fed to livestock	- gross farm revenue by farm and by impact zone
Estimation of On-Farm Employment	- Phase 4B questionnaire data on farm employment levels - characteristics of non-reporting farms	- farm employment levels for non-reporting farms estimated using average employment levels for reporting farms	- number of farm jobs and total weeks of work by farm

community. Due to the refusals, only partial coverage was achieved. Consequently, it was necessary to evaluate the questionnaire data to determine if it was representative of agricultural conditions in the study area.

Several data checks were made initially to verify the 4B questionnaire data. Individual questionnaires were checked for content consistency, as well as coding and computer entry accuracy (Appendix A-1).

Sample data were also verified using a statistical approach. Several descriptive statistics were drawn from the questionnaire data and compared to corresponding statistics reported in the 1986 census for enumeration areas that correspond in coverage to the study area. Statistical tests were performed to determine the extent to which the survey statistics agree with the census statistics. Discrepancies are to be expected due to normal sampling error, and also because the enumeration area boundaries do not correspond exactly to the study area boundaries.

Despite these sources of potential discrepancy between census and questionnaire data, all eleven tests conducted on descriptive statistics indicated that the data are not significantly different. These tests covered income, farm size, livestock population, cropping practices and off-farm work. The tests results, which are described in detail in Appendix D, confirm that the results of the interviews give a realistic representation of the agricultural sector in the study area as depicted by comparable indicators in the 1986 Census of Agriculture.

3.4.4 PROJECTION OF FUTURE CONDITIONS

Future conditions without the facility were projected for agricultural factors to establish a baseline against which to compare projected future trends with the facility. The projection considered general trends in the farm sector, local trends that are evident in published statistics, and forces related to land use planning and farm policy.

3.4.5 DEVELOPMENT OF IMPACT SCENARIOS

Table 3.3 describes generally how impact scenarios were developed for each impact factor or indicator. Predicted effects on receptors are determined in quantitative or qualitative terms. Where available, ambient conditions and environmental standards and guidelines are used as a basis for determining exposure effects.

3.4.6 SENSITIVITY ANALYSIS

The risk and impact factors can be classified as follows:

Quantitative and Certain

- impacts are predicted in quantitative terms and with a high degree of certainty

Quantitative and Uncertain

- quantitative predictions are provided but are subject to uncertainty due to assumptions that are made

Qualitative and Uncertain

- impacts are discussed only in qualitative terms; precise predictions cannot be produced due to uncertainty and data limitations

Sensitivity analysis is used to examine the significance of variations in key assumptions. It is required primarily for impact factors falling into the middle category. Impact predictions in the first category are considered sufficiently reliable that sensitivity analysis would be of

TABLE 3.3

PHASE 4B IMPACT SCENARIOS FOR AGRICULTURE

ZONE	FACTOR	INDICATOR	IMPACT MECHANISM	ASSESSMENT OF EFFECT
Site	Farm Displacement	- Total Displacement of Farms	land acquisition	evaluate loss due to displacement
	Loss of Farm Land	- - -	land acquisition	evaluate loss due to displacement
Local Community	Farm Displacement	- Partial Displacement of Farms	land acquisition	evaluate loss due to displacement
	Farm Family/Farm Operator Disruption	- - -	cumulative exposure to noise, dust, visual intrustion in direct and indirect impact zone	evaluate exposure levels relative to ambient conditions, environmental standards
	Farm Productivity Impacts	- Exposure to Nuisance Effects	crop and livestock exposure to noise, dust, etc.	evaluate exposure levels relative to ambient conditions, environmental standards
		- Atmospheric Emission Effects	direct damage to, or bioaccumulation by crop and livestock of pollutant emissions	evaluate exposure and uptake (Environ, 1987), compare to threshold levels and standards
		- Downstream Agricultural Activity	direct use of water downstream from site	evaluate livestock watering requirements and alternatives
	Farm Business Impacts	- Decrease in Property Value	reluctance of prospective property buyers due to nuisance and risk effects	evaluate extent of property value impact zone (Morehouse, 1987), relate loss to farm operations

TABLE 3.3 - cont´d

PHASE 4B IMPACT SCENARIOS FOR AGRICULTURE

ZONE	FACTOR	INDICATOR	IMPACT MECHANISM	ASSESSMENT OF EFFECT
Local (cont´d)	Farm Business Impacts (cont´d)	- Loss of Product Sales	farm product buyers stop buying due to perceived or real impacts of facility on farm products	identify and describe farm operators with sales at risk - i.e. locally identifiable products
		- Local Services	change in municipal services	evaluate farm activity along service corridors
	Agricultural Community Impacts	- Out-Migration of Farm Operators	combined nuisance and risk impacts induce farmers to leave	identify farmers who indicate an intent to leave, who are eligible for buy-out or who are subject to expropriation
		- Non-Farm In-Migration	non-farm in-migration of OWMC employees	potential change in farm/ non-farm population mix; potential for conflict between farm and non-farm land use
		- Erosion of Community Networks	impact on formal and informal networks caused by out-migration of farmers	identify farm association memberships and other community ties of those leaving the area
		- Off-Farm Employment with OWMC	employment of local farm residents by OWMC	evaluate potential employment of local population (Morehouse, 1987), review stated future plans of farm operators
		- Change in Local Agricultural Character	cumulative effect of other direct and indirect impacts	qualitative assessment of possible changes in type of farms, farmland ownership, etc.

TABLE 3.3 - cont'd

PHASE 4B IMPACT SCENARIOS FOR AGRICULTURE

ZONE	FACTOR	INDICATOR	IMPACT MECHANISM	ASSESSMENT OF EFFECT
Local (cont'd)	Agribusiness Impacts	- - -	sales volume declines due to out-migration of farmers	identify and describe agribusiness establishments, evaluate potential loss of sales at an aggregate level
Access Road	Loss of Farmland	- - -	land acquisition	evaluate loss due to displacement
	Farm Family/Farm Operator Disruption	- - -	exposure to noise, traffic volumes, etc.	identify and describe farm land and buildings within impact zone
	Farm Productivity Impacts	- Exposure to Nuisance Effects	crop and livestock exposure to noise, dust, etc.	evaluate exposure levels relative to ambient conditions, environmental standards
		- Interference with Farm Vehicles	interruption due to traffic volumes	describe farm vehicle traffic on road, identify critical areas of potential interference
		- Access Road Risk	exposure of crops and livestock to spills	evaluate potential for exposure
Region	Farm Productivity Impacts	- Atmospheric Emission Effects	exposure of crops and livestock to emissions and spills	evaluate potential for exposure

little value. For factors in the third category, predictions are not sufficiently precise to enable a meaningful sensitivity analysis.

In certain cases, the prediction of risk or impact is based on a worst case analysis of facility effects. Sensitivity analysis is not applied in these cases since an outcome that is more adverse than the predicted outcome is unlikely.

The factors are classified by type of risk and impact prediction in Table 3.4; comments on sensitivity analyses are provided.

3.5 SYNTHESIS AND EVALUATION

This section describes in general terms the means by which data were synthesized in order to predict impact levels and explains how predicted impacts were evaluated to assess severity.

3.5.1 PREDICTION OF RISK AND IMPACT

The method of prediction varies with the type of risk or impact. The most detailed data are available for direct impacts. For these, the information on predicted changes in the local environment, such as greater noise exposure, was combined with information on farms and farm operations exposed to the change. For nuisance effects associated with on-site activities, maps were used to combine the two sets of information. Impact zones for noise, dust and visual intrusion were combined into a cumulative impact zone. Exposure to nuisance impacts was then determined by farm location relative to the outer limits of this zone. Location was also the key determinant for determining on-site displacement and access road impacts. This analysis yielded predictions expressed in terms of numbers of affected farms, size of affected areas, etc.

TABLE 3.4

SENSITIVITY ANALYSIS FOR FACTORS

ZONE	FACTOR	TYPE OF PREDICTION	SENSITIVITY ANALYSIS
Site	Farm Displacement	quantitative, certain	none
	Loss of Farm Land	quantitative, certain	none
Local Community	Farm Displacement: - Partial Displacement of Farms	quantitative, certain	none
	Farm Family/Farm Operator Disruption	quantitative, uncertain	none, assessment based on worst case scenario
	Farm Productivity Impacts: - Exposure to Nuisance Effects	quantitative, uncertain	none, assessment based on worst case scenario
	- Atmospheric Emission Effects	quantitative, uncertain	none, assessment based on worst case scenario
	- Downstream Agricultural Activity	quantitative, uncertain	none
	Agricultural Community Impacts: - Out-Migration of Farm Operators	quantitative, uncertain	various assumptions about the number of farmers leaving
	- Non-Farm In-Migration	qualitative, uncertain	none
	- Erosion of Community Networks	quantitative, uncertain	based on "out-migration" assumptions
	- Off-Farm Employment with OWMC	qualitative, uncertain	none

TABLE 3.4 - cont´d

SENSITIVITY ANALYSIS FOR FACTORS

ZONE	FACTOR	TYPE OF PREDICTION	SENSITIVITY ANALYSIS
Local Community	- Change in Local Agricultural Character	qualitative, uncertain	none
	Impact on Agribusiness	qualitative, uncertain	based on "out-migration" assumptions
	Farm Business Impacts:		
	- Decrease in Property Value	qualitative, uncertain	none
	- Loss of Product Sales	qualitative, uncertain	none
	- Local Services	quantitative, certain	none
Access Roads	Loss of Farmland	quantitative, certain	none
	Farm Family/Farm Operator	qualitative, uncertain	none
	Farm Productivity Impacts:		
	- Exposure to Nuisance Effects	quantitative, uncertain	none
	- Interference with Farm Vehicles	qualitative, uncertain	none
	- Access Road Risk	quantitative, uncertain	none, assessment based on worst case scenario
Region	Farm Productivity Impacts:		
	- Atmospheric Emission Effects	quantitative, uncertain	none, assessment based on worst case scenario

Indirect impacts arise as a secondary response to or outcome of direct impacts. Such responses cannot be forecast with certainty. In some cases, questionnaire data provided a basis for impact prediction, while in others, predictions could be made only in a qualitative sense based on available information from literature sources.

Risk factors were evaluated by comparing predicted concentrations of contaminants in soils, water, air and farm products to available standards and threshold levels. This evaluation determined the potential for significant toxicity or other effects.

Impact predictions incorporate alternate levels of mitigation. Basic risk and impact levels assume no mitigation beyond certain measures to which OWMC is committed, such as on-site design features for impact and risk reduction. Residual risks and impacts take into account the effect of impact management measures in reducing receptor exposure or compensating for receptor effects.

3.5.2 ASSESSMENT OF SEVERITY

Judgements were made regarding the severity of various risks and impacts by considering predicted effects in light of criteria that relate to the adverse nature of those effects. The following criteria (OWMC, 1988) were used in this assessment:

Sensitivity to Change - This criterion considers the stability of a feature or environment and its ability to withstand or recover from stress or change. The greater the sensitivity to change, the greater the potential significance of impacts.

Importance of Feature Affected - Significance pertains to the importance of a feature or resource within the region or community irrespective of the magnitude of predicted impacts.

Magnitude of Effects - Magnitude treats impacts in an absolute sense. It compares impacts to conditions without the facility. Magnitude considers the severity of negative or positive impacts.

Frequency and Duration - With some factors, impacts occur very briefly or very occasionally. With other factors, impacts will occur over the operating life of the facility. For example, farm operations located adjacent to the OWMC site will be exposed to visual effects throughout the duration of facility operations.

Comparison with Provincial and Municipal Standards and Guidelines - Some factors have specific standards and guidelines established by the Province of Ontario, by the government of Canada, or by municipal jurisdictions as a basis for assessing risks and impacts associated with the OWMC facility. The Provincial Foodland Guidelines are an example related to preservation of farmland.

Public and Agency Preferences and Perceptions - Public and agency input provided through the Phase 4B questionnaire survey, at OWMC workshops, at meetings with agencies, and through discussions with individual farmers have provided information to be used in the interpretation of significance of risks and impacts.

Certainty of Prediction - With some impacts, such as loss of farmland, impacts are well understood and the magnitude of potential impacts can be predicted with a considerable degree of accuracy. With other impacts, such as change in community networks, impact predictions are less precise. The certainty of predictions is related to the range of data employed, reliability of the data, extent of qualitative judgements and professional interpretation of results. In cases where there is the potential for serious unanticipated impacts, the impact is considered to be of greater significance.

CHAPTER 4

EXISTING CONDITIONS

4.1 INTRODUCTION

One of the requirements of a submission under the Ontario Environmental Assessment Act is documentation of existing conditions of the affected environment at the proposed site and surrounding area. This information is used as a baseline for identifying and evaluating the effects that the construction and operation of the OWMC facility will have on agriculture surrounding the preferred site.

This section on existing conditions is divided into four parts as follows:

Overview of Agriculture Development in West Lincoln Township traces the historical development of agriculture in West Lincoln from 1775 to the present time, describing some of the key forces which have shaped agriculture in the area (physical environment, agricultural economy and land use planning).

Characteristics of the Local Community describes characteristics of the site. Included is a discussion of the land resources (topography, soil series and capability), land use, farms and farm operators, tenure, productivity, farm income and employment.

Characteristics of the Preferred Site examines the characteristics of agriculture on the preferred site including land resources and land use, and characteristics of the farms and farm operations.

Characteristics of the Preferred Access Route describes the characteristics of farms abutting the preferred access route and use of the roads by farm-related traffic.

Primary and secondary sources of data used to document existing agricultural conditions are similar to those outlined in Chapter 3. Emphasis in this chapter has been placed on understanding the historical forces at work in West Lincoln Township and the surrounding Region, so that impacts occurring on-site and in the local community are understood in light of the larger Regional and Provincial context. Documentation of this nature was derived largely from secondary sources of literature.

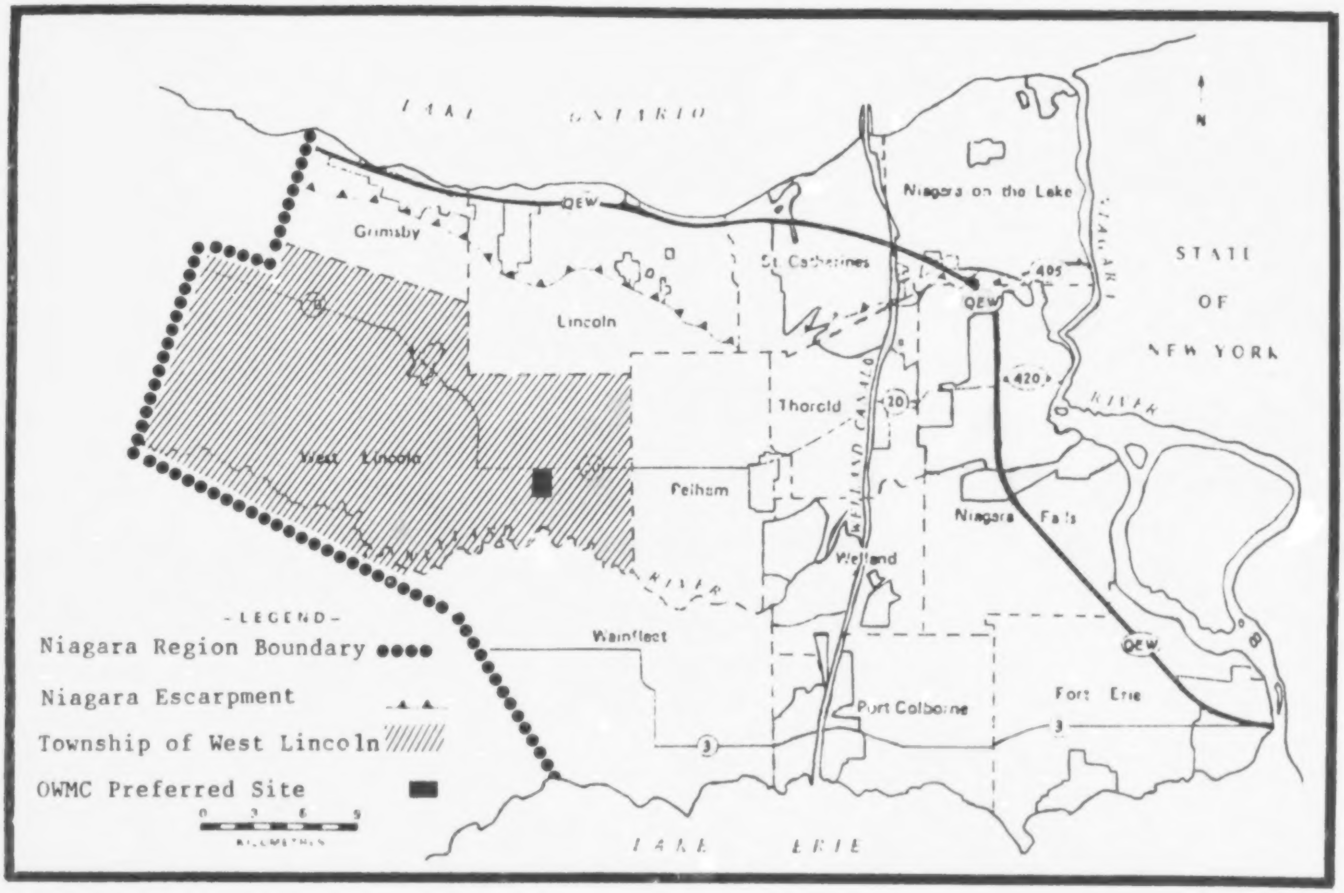
4.2 OVERVIEW OF AGRICULTURAL DEVELOPMENT IN WEST LINCOLN TOWNSHIP, REGION OF NIAGARA

4.2.1 INTRODUCTION

The Township of West Lincoln is located centrally within the Niagara Peninsula at the western end of the Regional Municipality of Niagara. The entire Township is situated south of the Niagara escarpment, with the Welland River forming a natural boundary along much of the Township's southern edge. West Lincoln's geographical relationship to the other Municipalities within the Region, as well as to the neighbouring Regional Municipalities of Haldimand-Norfolk and Hamilton-Wentworth, is shown in Figure 4.1.

FIGURE 4.1

THE REGIONAL MUNICIPALITY OF NIAGARA SHOWING
WEST LINCOLN TOWNSHIP AND THE OWMC PREFERRED SITE


LAKE ONTARIO
N
Grimsby
QEW
Niagara on the Lake
St. Catharines
405
STATE OF NEW YORK
NIAGARA RIVER
Lincoln
420
Thorold
20
WELLAND CANAL
West Lincoln
Pelham
Niagara Falls
Welland
WELLAND RIVER
Wainfleet
Port Colborne
Fort Erie
3
LAKE ERIE
- LEGEND -
Niagara Region Boundary ●●●●
Niagara Escarpment
Township of West Lincoln
OWMC Preferred Site
0 3 6 9
KILOMETRES

Prior to 1970 when Regional government was instituted in the Peninsula, West Lincoln Township was comprised of three Townships - Caistor, Gainsborough and South Grimsby. At that time, these Townships formed part of Lincoln County located in the north portion of the Peninsula; the south part was known as Welland County. Even though these two Counties were amalgamated under Regional government, many of the local farm organizations still reflect these historical administrative boundaries. Organizations such as the Niagara Federation of Agriculture, the Niagara Soils and Crops Improvement Association, are composed of independent chapters which continue to function in both `Niagara North´ and `Niagara South´ sections of the Region.

Within the agricultural diversity of the Niagara Peninsula, West Lincoln is best known for its mixed farming and intensive livestock production. A comparison of Census of Canada agricultural statistics for the Region and the Township for 1986 reveals that 57 percent of the Region´s dairy cows, 31 percent of its pigs and 34 percent of its hens and chickens are located on West Lincoln farms (Appendix C, Table C-2).

4.2.2 SOCIO-CULTURAL CONTEXT

The Niagara Region, including West Lincoln, was initially settled by United Empire Loyalists following the American War of Independence in 1776 (Niagara Federations of Agriculture, 1976). These early settlers were primarily of British and German background, as documented by the Niagara Federations of Agriculture (1976) and as evidenced by the mix of British and German names of these settlers recorded by the West Lincoln Historical Society (W.L.H.S., 1985). On the initiative of Lieut. Governor Simcoe, County and Township names were anglicized; hence, names such as Lincoln, Caistor, Gainsborough and Grimsby came into being.

These early settlers grew wheat for the army garrisons and the fur-trading North West Company; livestock raising and fruit growing were considered sideline enterprises (Ontario Department of the Environment, 1972). In subsequent years, fruit farming expanded north of the escarpment, while dairying and mixed cropping dominated south of the escarpment.

There are many farm families in the Township today whose ties to the land go back several generations. The West Lincoln Historical Society (1985) identifies 43 century farms in the Township, three of which are still owned and farmed by descendents of families who originally purchased the land from the Crown in the late 1700′s.

In the more recent past, individuals from various ethnic groups including Greek, Dutch and German origin have contributed their specialized skills to the betterment of local agriculture. This blend of skills has contributed to the initial growth of the chicken and turkey broiler industry (Regional Municipality of Niagara, 1971) and to the current productivity of the dairy industry in West Lincoln (W.L.H.S., 1985).

Many West Lincoln farmers have a history of involvement in farm organizations (W.L.H.S., 1985). Today, the links between many farmers are still strong as evidenced by farm organizations such as producer associations, marketing boards, breeder associations, 4-H clubs, Women′s Institute, etc. that are functioning in North Niagara (Ontario Ministry of Agriculture and Food, 1987). Many of the leadership positions within these organizations are filled by residents of West Lincoln Township.

4.2.3 PHYSICAL ENVIRONMENT

Much of the Niagara Peninsula between the Niagara Escarpment and Lake Erie is a plain of low relief, covered by heavy textured soils. The Haldimand Clay Plain encompasses West Lincoln in its entirety, with the exception of a relative narrow strip of till moraine in the northern part of the Township bordering the Town of Grimsby.

The majority of the soils associated with the Haldimand Clay Plain in West Lincoln have been characterized as imperfectly or poorly drained clays, clay loams and silty clay loams. Percolation of water is very slow through these compact soils, imposing moderate limitations on the range and productivity of crops grown (Regional Municipality of Niagara, 1971). A small arm of well drained clays, silty clays, clay loams and silty clay loams juts into West Lincoln in the St. Ann´s area, from the Town of Lincoln, primarily bordering Twenty Mile Creek.

The Niagara Region is known for its moderate climate, as evidenced by its relatively long growing season, adequate rainfall, high mean daily temperatures and high number of corn heat units (Regional Municipality of Niagara, 1977a; Ontario Ministry of Agriculture and Food, 1985). The climate for West Lincoln follows this Regional pattern, although because of its central location within the Peninsula, the growing season is marginally shorter and slightly fewer corn heat units are available for crop growth when compared with lands located in more easterly parts of the Peninsula and lands closer to the lakeshores. All of the land within West Lincoln is located above the Niagara Escarpment and does not benefit from the microclimatic benefits of the escarpment.

The characteristics of West Lincoln´s physiography, soils and climate have influenced the development of farming systems in the area. A livestock-based, mixed agricultural system has developed within West Lincoln. Hay, pasture, cereal grains and grain corn in rotation are the dominant crop types. The Land Resource Research Institute (1983) reports that a much smaller acreage is devoted to continuous, intensively grown row crops such as corn and soybeans. The same source indicates that a few vineyards are located in the north end of the Township between Highway 20 and the boundary of the Town of Grimsby. However, the constraints imposed by the clay soils in West Lincoln are such that no commercial production of tender fruits takes place in the Township. Most soils in the Township require careful soil management such as organic matter incorporation and well-timed cultivation to build and maintain productive capacity (Regional Municipality of Niagara, 1971).

4.2.4 AGRICULTURAL ECONOMY

Much of West Lincoln´s economic activity centres on agriculture and related rural enterprises. Relatively small hamlets and villages are scattered throughout the Township, the largest town being Smithville (population 2400) which serves as the municipal centre for West Lincoln as well as a service centre for the surrounding agricultural community.

During the past twenty years, costs of farm production in Ontario have risen more quickly than the prices of farm produce. As a result, farm operators have tended to specialize, to expand their scale of operation and to generally become more efficient. Increasing mechanization, more productive crop varieties and livestock breeds and greater use of chemcials and other agricultural inputs have allowed farmers to increase output.

West Lincoln Township has experienced this trend towards specialization, particularly within the livestock sector. An analysis of Census of Agriculture data from 1961 to 1986 indicates a large increase in the total numbers of pigs and poultry in West Lincoln (Appendix C, Table C-2). These increases have been greater in West Lincoln than in

Niagara Region and Southern Ontario Region.[2] For example, since 1961, there has been a 296 percent increase in pigs and a 314 percent increase in the number of poultry in West Lincoln compared to 148 percent and 53 percent respectively for Southern Ontario. The number of dairy cows on West Lincoln farms has declined somewhat over this 20 year time period, although not as dramatically as in the remainder of Niagara and Southern Ontario Region.

The significance of the poultry industry in West Lincoln, relative to Southern Ontario, can further be appreciated when it is realized that 12% of all of Southern Ontario Region's hens and chickens in 1981 were located in West Lincoln (Appendix C, Table C-2).

There are certain reasons why livestock operations have flourished in West Lincoln. First, productive soils and good drainage are not as important for intensive poultry operations as they are for other types of farming (Regional Municipality of Niagara, 1972). Poultry require feed that is formulated and prepared in a highly controlled and standardized manner; this feed is usually purchased from feed mills. Thus, land is used primarily for buildings and for manure disposal and not necessarily as a means to provide feedcrops.

Second, the late sixties was a time of increasing stability in the dairy, egg and broiler (chicken and turkey) industries with the advent of marketing boards. These boards regulated supply of these commodities and tied prices, in part, to cost of production formulas. The economic stability brought about by organized marketing boards helped reinforce affected West Lincoln livestock operations.

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[2] Southern Ontario Region as defined by the 1986 Census of Agriculture, includes the Regional Municipalities and Counties of Brant, Elgin, Essex, Haldimand-Norfolk, Hamilton-Wentworth, Kent, Lambton, Middlesex, Niagara, and Oxford.

Although intensification of certain types of livestock operations has occurred in West Lincoln, there has not been a corresponding increase in the intensity of cropland use. For example, Census of Agriculture data for the years 1961-1986 indicate that there has been a relatively small increase in the total area under crops in both West Lincoln and the Niagara Region, when compared with the much larger percent increase in area under crops for Southern Ontario Region as a whole (Figure 4.2).

4.2.5 REGIONAL AND LOCAL OFFICIAL PLANS

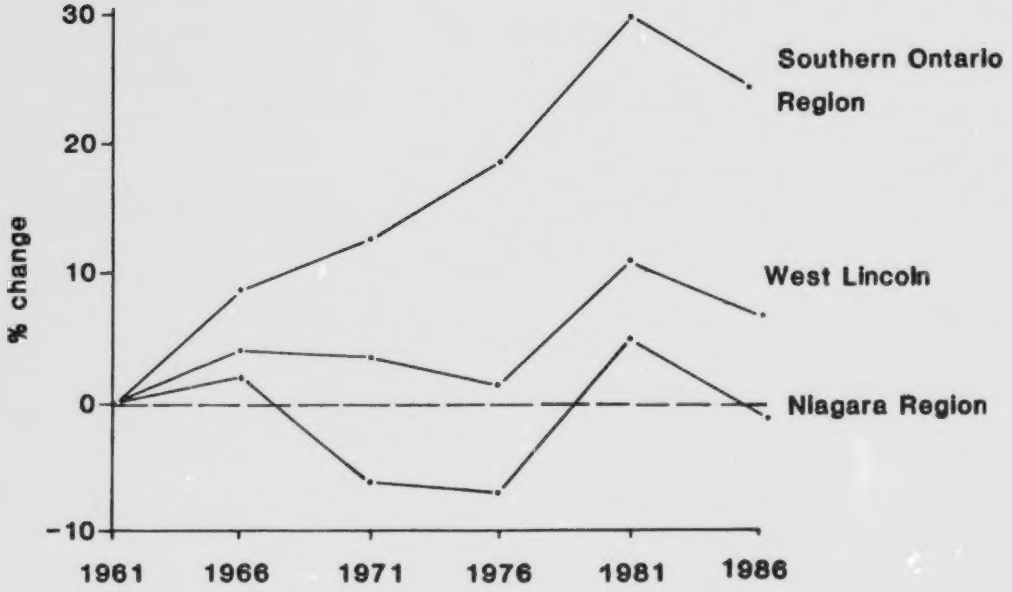
Regional government in Niagara was established in 1970. At that time, numerous studies were undertaken to provide a basis for the formulation of the Regional Niagara Policy Plan which was subsequently approved by the Provincial Government in 1981 (Regional Municipality of Niagara, 1981). West Lincoln's Official Plan was adopted by Council in 1975 (West Lincoln Planning Board, 1975).

Virtually all of the land in The West Lincoln Official Plan has been designated as rural land with the `predominant use of land for agriculture, forestry, and activities connected with the conservation of soil and wildlife.´ Policies applying specifically to development in rural or agricultural areas are intended to preserve agriculture primarily on Class 1 or 2 soils of the C.L.I. soil capability rating, to protect existing uses, to reduce conflicts among permitted uses, and to reduce scattered non-farm development (The Official Plan of the West Lincoln Planning Area, 1975 p. 10-12.).

In 1974, the Regional Land Division Committee took over the processing of consent applications for severances from the Township Committees of Adjustment. The average number of consents granted annually in West Lincoln from 1975 to 1979 was 36 (Table 4.1). The corresponding number for the years 1980-1985 was 20. While the proportion of severances involving agricultural land is not clear from these reports, the data

FIGURE 4.2

CHANGE IN TOTAL AREA UNDER CROPS - 1961-1986



Source: Census of Agriculture, Statistics Canada, 1961-1986.

TABLE 4.1

NUMBER OF CONSENTS GRANTED FOR PROPERTY SEVERANCES - 1975-1985

												AVE. NO./YR	
	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1975 TO 1979	1980 TO 1985
West Lincoln	41	30	44	33	34	27	18	9	21	27	17	36	20
Niagara Region	425	560	518	514	526	385	290	267	322	310	394	509	311

Source: Land Division Committee Annual Reports, 1975-1985.

suggest that fewer consents have been approved in recent years on agricultural land.

In order to reduce conflicts between farm and non-farm land uses, the Township enacted a bylaw to control the location of intensive livestock operations, and the storage and disposal of manure. Solid manure is not to be spread on land closer than 600 feet from neighbouring dwellings, and liquid manure, 1000 feet from neighbouring dwellings (Regional Municipality of Niagara, 1972).

In general, it appears that steps have been taken within the land use planning framework to encourage the protection of agricultural lands. Their effectiveness depends on the continuing implementation of Regional and Township land use policies.

The West Lincoln Official Plan is currently being updated to bring it into conformity with the Regional Official Plan. One of the main objectives of the plan is to preserve prime agricultural lands for agriculture. The proposed amendment replaces the rural policies with `Agricultural´ and `Rural´ policies.[3] The dominant use of designated Agricultural lands will be for `agriculture of all types including livestock and poultry uses and farm related residential uses.´ Policies in this area are intended to preserve the best agricultural soils in the township for agricultural purposes, maintain viable farm units, maintain minimum separation distances between livestock/poultry operations and non-farm uses (using the Ontario Ministry of Agriculture and Food Agricultural Code of Practice) and permit additional farm-related residences without severances.

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[3] Miller, O´Dell and Paul, Official Plan Update Amendment No. 8., March 5, 1986.

Land in the west part of the Township, in the vicinity of Caistor Centre and Abingdon have been designated as `Rural.´ The dominant use of `Rural´ lands will also be for `agriculture of all types including livestock and poultry uses and farm related residential uses´ (Miller, et al., 1986). Other nonagricultural uses such as small-scale commercial, industrial, and Estate Residential developments may also be permitted if they meet criteria related to minimum separation distances, severances, and compatibility with existing agricultural uses.

4.3 CHARACTERISTICS OF THE LOCAL COMMUNITY

4.3.1 INTRODUCTION

The purpose of this chapter is to describe the characteristics of agriculture within the local community surrounding the OWMC preferred site. Included are discussions of land resources, land uses, farm characteristics, operator characteristics, land tenure, productivity, farm income and farm employment. The area encompassed by the local community is defined in Section 2.2.2 (Figure 2.1).

4.3.2 LAND RESOURCES

The topography of the local community can be described as undulating to very gently rolling land composed of a series of depressions and slight ridges which traverse the landscape. Some steeper slopes are present in the vicinity of the main watercourses: these include the Welland River which forms the southern boundary of the area and Twenty and Fifteen Mile Creeks to the north and the northeast. The watershed divide between these watercourses is located in the vicinity of Number 15 Side Road.

The surface texture of the soils in the local community is fairly uniform as more than 80 percent of the area is classified as silt loam or silty clay loam. Loam textured soils occupy about 10 percent of the area while bottomland and floodplains account for the remaining 10 percent.

Soil drainage is quite variable as a result of the depression and ridge topography. There are imperfectly to moderately well drained soils on the ridges and slopes with poorly drained soils in the low lying depressions.

There are some broad differences in the distributional pattern of soil types and drainage classes. In the vicinity of the Twenty and Fifteen Mile Creeks and the Welland River, moderately well drained soils are generally found next to the poorly drained depressions. The better soil drainage in these areas is due to the steeper topography near the waterways. The poorly drained depressions are usually narrow and shallow and do not impede the use of farm machinery in the spring, thereby allowing cultivation to take place across them. Drainage improvements have been made in some areas through the installation of tile drainage. Random systems dominate with only a few areas systematically tile drained. South of Highway 20, large areas have been randomly tile drained. Some localized areas along the Twenty and Fifteen Mile Creek have also been tile drained.

In areas north of Highway 20 but away from the immediate vicinity of Twenty and Fifteen Mile Creeks, the depressional areas are larger and deeper. The size and shape of the fields is often affected by the location of the poorly drained depressions. Access to the better drained soils on the slopes in the spring can be impeded by these poorly drained depressions, thereby delaying planting operations and subsequently lowering crop yields.

Soil Capability for Agriculture

Soils rated as Class 3 for agriculture dominate in the local community, accounting for 80 percent of the total land available for agriculture (see Table 4.2). Soils in this class have moderately severe limitations that restrict the range of crops or require special improvement and conservation practices. In West Lincoln, drainage is the main limitation. Class 2 soils occupy 11 percent while Class 4 and 5 soils combined account for nine percent of the area.

The poorly drained soils in the depressions are Class 3 with Class 2 soils usually in close proximity to the depressions. The productive potential of the Class 2 soils may be reduced if access in the spring is impeded by the surrounding poorly drained depressional soils.

The Class 3 land includes soils with a loam surface texture. The lighter surface texture of these soils allows earlier access in the springtime; they are generally more workable and less prone to compaction. These soils, however, are also interspersed with poorly drained depressions which restrict early access in the spring. Hence their productive potential is not being realized.

The soil capability ratings in this area are significantly different from those in the group of counties and regional municipalities that comprise the Southern Ontario Region. In Southern Ontario Region, 15 percent of the soils are Class 3, whereas 47 percent and 23 percent are Class 2 and Class 1 respectively (Environment Canada, 1975).

4.3.3 LAND USE

The dominant use of land in the local community is agricultural. A mixed agriculture system dominates, with many farms supporting more than one livestock type and growing a diversity of crops (hay, small grains and

TABLE 4.2

AREA OF SOIL CAPABILITY CLASSES IN THE LOCAL COMMUNTIY

Canada Land Inventory Soil Capability Class	Total Area (ha)	Agricultural Land (ha)	Designated Residential Commercial and Industrial Land (ha)	Agricultural Land as a Percent of Total Area*
1	--	--	--	--
2	1,114	985	156	11
3	7,423	6,826	579	80
4	347	313	29	4
5	494	443	46	5
TOTAL	9,378	8,567	810	100

* excludes residential, commercial and industrially zoned land.

Source: Ontario Institute of Pedology, 1985.

corn) for livestock feed. Agricultural and non-agricultural land uses in the local community, including community and recreation features, commerical and industrial properties, are identified on the land use map (see Figure 4.3).

Eighty-six percent of the farmland in the local community is improved land.[4] This is only slightly lower than the 89 percent for Southern Ontario Region (Appendix C, Table C-3).

Sixty-seven percent of the farmland was cropped in 1986. Of the remaining improved land, 5 percent was pasture, 5 percent summer fallow, and 10 percent idle or in other uses. The proportion of cropped land is significantly lower than that reported for the Southern Ontario Region where 81 percent of the land is cropped; summer fallow, idle and other uses comprise four percent of the farmed area. Conversely, a higher proportion of the lands in the local community are wooded (13 percent) compared with the Southern Ontario Region (6 percent).

Agricultural land use trend data are not available at the local community level. Census figures for the former Gainsborough Township[5] for 1966 and 1986 show little change in the proportion of improved land. The area of cropped land has increased slightly, whereas pasture and woodland have decreased (Appendix C, Table C-3). The amount of fallow land has remained relatively constant over the 20 year period.

Scattered throughout the community are several small hamlets or towns: St. Ann's to the northwest on Regional Road 69, Silverdale to the north on Regional Road 16, Bismark to the west on Highway 20, Wellandport to the southwest on Road 27 and Boyle to the southeast. Rural residential houses have been built in the areas outside the boundaries of existing settlement areas. These tend to be scattered throughout the area with some concentrations along Highway 20 and in the more hilly areas alongRegional Roads 69 and 16. Relatively little rural residential development has occurred in the south portion of the study area, although some lots have been established along the Welland River.

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[4] improved land includes cropped land, improved pasture, summer fallow, improved idle land, and farm buildings, etc. as defined by the Census of Agriculture, Statistics Canada, 1986.

[5] Gainsborough Township was incorporated by West Lincoln Township in 1970. The local community is within the boundaries of the former Gainsborough Township.

Only small amounts of industrial or commercial lot development have occurred in the rural areas. These are typically related to construction (building supply, etc.) or transportation sectors (garages, etc.), or provide residential support services (variety stores, insurance, etc.) to the rural community.

4.3.4 FARM CHARACTERISTICS

The headquarters for 139 farms are located within the community. This estimate is based on Ministry of Revenue taxation assessment roll information, interviews with farm operators, and windshield surveys conducted in the summer of 1986.

The following describes the types of farms located in the study area:

Dairy - Thirty-three dairy farms were identified in the local community. The number of milking cows per farm generally range from 30 to 60 and average 41. Five of the 33 farms milk less than 20 cows. Two of these are operated by retired farmers and three appear to be part-time operations. The remaining 29 operations are all full-time. These farms average 106 ha (262 acres) in size and most operators own the land base. A few operators rent additional cropland. Several dairy farmers raise beef or hogs as well, but overall, dairying is the principal activity on these farms.

The dairy farms are generally scattered over much of the study area, with some concentration in the St. Ann's area and in the south-central portion of the study area.

Poultry - There are 22 commercial-sized poultry farms located in the local community. These farms include seven egg producers, five turkey operations, eight with chicken broilers and two with a combination of turkeys and chicken broilers.

Fourteen of these operations derive their income from the sale of poultry; they rent their land to other local farmers. The remaining eight operators are more diversified, combining beef, dairy or cash crop with the poultry business. Those combining cash cropping with poultry tend to rent additional cropland. There are also two part-time farms reporting less than 100 laying hens.

An additional farm operation which combines poultry with a large beef feedlot is referenced under "Mixed Crops or Livestock."

The majority of the poultry operations are concentrated along Sixteen Side Road, along Highway 20 and near Wellandport.

Beef - Thirteen farms have been identified as beef farms. The group includes farms reporting beef as its major livestock type on the questionnaire and those identified during the windshield survey. The number of cattle range from 15 to 100; the average farm size is 48 hectares (120 acres). Virtually all land on these farms is owned by the operator. Two of the operators who responded to the questionnaire are part-time. Beef farms are dispersed throughout the local community.

An additional farm operation which combines poultry with a large beef feedlot with poultry is referenced under "Mixed Crops or Livestock."

Hogs - Hogs were identified as the main enterprise on nine farms. These farms include six farrow-to-finish and three feeder hog operations. Two of the nine hog farms are part-time operations. Of those responding to the questionnaire, farm size averages 48 ha (119 acres) per farm. Three operations are on small parcels of less than 16 ha (41 acres). Two of the larger operations combine other types of livestock such as beef cattle, while six include some cash cropping. The average area of these six operations is 79 hectares (195 acres). Almost all of this land is owned by the operator.

Hog operations are evenly distributed throughout the local community.

Cash Crop - Ten cash crop farmers were identified. Those operators who responded to the questionnaire farm an average of 155 ha (385 acres). About 40 percent of this area is rented. Two of the largest cash croppers identified livestock (beef or sheep) as important components of their farm operation. Two others are small scale; one is part-time and the other crops less than 20 hectares (50 acres).

In addition to these ten farmers, another six cash croppers living outside the local community are known to farm parcels within. They travel an average of 13 kilometres from their headquarters to these properties. Most of these farmers crop over 200 hectares (500 acres) in total, and use an average of 50 hectares (125 acres) within the local community.

The cash cropping activity tends to occur to the southeast of Highway 20.

Mixed Crops or Livestock - There are 16 farms producing mixed crops or livestock. Two of these are relatively large mixed livestock farms. One is a large dairy/beef operation and the other is a combination of a large beef feedlot and chickens.

The remaining farms in this group are smaller operations producing mainly beef and mixed crops. Most of these properties are less than 40 hectares (100 acres). Several rent out the cropland. Six of the operators responding to the questionnaire categorized themselves as part-time or retiring farmers.

Miscellaneous Specialty - There are eight specialty farms with headquarters in the local community producing sheep, goats, specialized poultry or birds, furs, flowers, fruit and vegetables. The fur, bird, and flower operations are on properties measuring less than 10 hectares (25 acres) while the sheep, goat and vegetable farms average 26 hectares (65 acres) in size.

Two other farm operators with residences located outside the local community are producing fruit (19 hectares [48 acres]) and fur within the boundaries of the local community. These two farms are included as farms within the local community because most of their farm revenues are generated on these parcels.

Hobby/Horse Farms - Thirteen hobby and seven horse farms were identified. Ten operators classified themselves as hobby farmers in the questionnaire survey. The horse farms are small, supporting from 1 to 12 horses.

Idle - Six properties assessed as farms by the Ministry of Revenue tax assessment rolls were not in operation in 1986. One of these, a dairy farm, is temporarily out of production but is expected to be back in production in the near future.

Organization

It is clear from the 1986 survey results that the vast majority of the farms in the study area are family run businesses. Of those farmers responding to the survey, 62 percent reported that their farms are organized as partnerships among family members, 32 percent are sole proprietorships, and the remaining 6 percent are corporations with shares owned primarily by family members.

Most of the farm respondents (82 percent) stated that they as individuals (or along with a spouse) are the principal operators and decision-makers in the farm operation. The remaining 18 percent reported that other family members (sons, brothers and sons-in-laws) were involved as principal operators. Assuming that these proportions are representative of other farms in the local community, then a minimum of 25 additional individuals or households are linked to local farms because of their principal operator status.

4.3.5 CHARACTERISTICS OF THE FARM OPERATORS

The original farmers who settled in the local community are primarily of British and German background, descendants of United Empire Loyalists. Twelve families were identified by local farmers as having farmed in the area for many generations.

From the 1950's to early 1960's there was an influx of farmers with Greek, Dutch, German and Ukranian origins. Local farmers estimate that 60 percent of the dairy farmers have Dutch origins, and 80 percent of the poultry farmers have Greek origins. Many of these farms are being transferred to the second generation in Canada.

A comparison of the age profile of the farm households of farmers who responded to the farm survey with the age profile of farm households in the 1981 Census of Population for the former Gainsborough Township indicates many similarities. Both sources indicate that 25 percent of the population lies within the 35-54 age group while 14% are 55 and older. A slightly higher proportion of young people (<20 years) are reported in the Census for the former Gainsborough (44 percent) relative to the survey results (39 percent). In general, however, the survey results of household age groups can be considered to be representative of the age groups of farm households within the local community.

Information specific to the age of the farm operators themselves is limited to what is reported for the former Gainsborough Township in 1981. At that time, 15 percent of the operators were in the 20-34 year age group, 59 percent in the 35-54 year age group, and 26 percent were in the 55 and older age group.

4.3.6 LAND TENURE

A major proportion (77 percent) of the lands assessed as farmland by the Ministry of Revenue are owned by the operator. Those operators who own all the land they farm, tend to own parcels close to their headquarters.

Approximately 44 percent of the land is operated by farmers who farm a combination of owned and rented land. There is no distinctive rental pattern. Farmers appear to be renting parcels as they become available in the area.

Questionnaire data describing rental agreements in the area reveal the following:

- most (59 percent) of the properties have been rented for less than five years
- fifty-eight percent have lease arrangements that run from year to year

- thirty-three percent have rental arrangements involving crop-sharing or the exchange of farm help rather than cash rent

- the average annual cash rent paid for farmland is \$37/ha (\$15/acre). This is lower than the cash rent reported in the 1986 Census of Agriculture for both West Lincoln and the Niagara Region - \$101/ha (\$41/ac). Rent paid on a cash basis for Southern Ontario Region averaged \$129/ha (\$52/ac).[6]

4.3.7 CROPPING PATTERNS

A wide range of field crops were grown in 1986. Specific crops include 2378 ha (5,877 acres) of hay, 1531 ha (3,785 acres) of corn, 1567 ha (3,873 acres) of small grains, 236 ha (585 acres) of soybeans, and 26 ha (66 acres) under cultivation for specialty crops (apples, market garden, sweet corn). A complete listing of crops and their acreages appears in Table 4.3.

The highest proportion of corn and small grains is grown in the southern part of the local community on soils which are more extensively tile drained or have better natural drainage characteristics. Lands in the vicinity of Number 15 Side Road are on the drainage divide between the Welland River to the south and Twenty, Sixteen and Fifteen Mile Creeks to the north. Poor soil drainage is a constraint to cultivation and a higher proportion of the land remains in woodlots. Hay crops and pasture dominate the cleared land. Local farmers report that Highway 20 blocks drainage to the Welland River.

To the north, within the vicinity of Twenty and Sixteen Mile Creeks, hay and small grains dominate. There are scattered blocks of row crops but they are less prevalent than in the south portion of the local community.

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[6] The cash rent reported in the 1986 Census of Agriculture is for 1985.

TABLE 4.3

CROPS GROWN WITHIN THE LOCAL COMMUNITY, OLD GAINSBOROUGH TOWNSHIP AND THE SOUTHERN ONTARIO REGION

	LOCAL COMMUNITY[1]			OLD GAINSBOROUGH TOWNSHIP[2]					SOUTHERN ONTARIO REGION[2]		
	1986		% OF TOTAL CROPLAND	1966		1986		% OF TOTAL CROPLAND (1986)	1986		% OF TOTAL CROPLAND (1986)
	(hectares)	(acres)		(hectares)	(acres)	(hectares)	(acres)		(hectares)	(acres)	
Wheat	568	1,403	10	152	375	854	2,109	8	155,173	383,441	12
Oats	253	624	4	1,565	3,868	458	1,131	5	24,952	61,659	2
Barley	456	1,126	8	67	165	764	1,888	8	30,303	74,882	2
Mixed Grains	178	439	3	130	320	184	454	2	24,322	60,102	2
Corn	1,530	3,780	27	1,107	2,736	2,227	5,502	22	452,041	1,117,019	35
Buckwheat	6	15	—	- -	- -	- -	- -	—	657	1,624	—
Soybeans	226	558	4	- -	- -	505	1,247	5	320,293	791,462	25
Total Hay	2,378	5,877	42	6,142	15,176	5,683	11,858	48	129,843	320,851	10
Other Field Crops (white beans, trefoil)	108	267	2	- -	- -	- -	- -	—	- -	- -	—
Vegetables	4	10	—	- -	- -	3	7	—	39,480	97,558	3
Tree Fruits	22	54	—	- -	- -	7	16	—	13,882	34,305	1
Small Fruits	0	1	—	- -	- -	- -	- -	—	10,611	26,220	1
Nursery	4	11	—	- -	- -	- -	- -	—	2,379	5,881	—
Total Cropland[3]	5,733	14,165	—	9,424	23,287	10,203	25,031	—	1,285,131	3,175,629	—

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[1] Phase 4B (1986) questionnaire survey of farm operators and windshield survey.
[2] Census of Agriculture 1966 and 1986, Statistics Canada.
[3] The Total Cropland for Old Gainsborough Township includes crops not grown in the local community (e.g. peas, rye and flaxseed).

There have been two notable changes in cropping patterns in Southern Ontario over the last two decades: (1) an increase in cropland acreage despite a decline in total farmland;[7] and (2) a shift towards more intensive cropping, mainly grain corn and soybeans.

An examination of crops reported in the Census of Agriculture for the former Gainsborough Township for 1966 and 1986 indicates that, although there has been an increase in cropland (8 percent) the trend towards intensification of crops has not kept pace with Southern Ontario as a whole. In the local community, corn comprises 27 percent of the cropland; soybeans 4 percent; small grains 25 percent and hay 42 percent; whereas in the Southern Ontario Region, corn comprises 35 percent, soybeans 25 percent; small grains 18 percent and hay 10 percent of the cropland. Given that livestock operations dominate in the area, it is not surprising that a considerable proportion of cropland is devoted to feed crops.

4.3.8 CROP YIELDS

Comprehensive coverage of reported crop yields at the local community level is not available. Consequently, O.M.A.F. production information for Niagara Region is used as a general indicator of yields in the local community. The 1985 crop yields, and a 5-year average for the years 1981 to 1985 are shown in Table 4.4.

The 1985 growing season was excellent in the Niagara Region and in Southern Ontario as a whole, particularly in relation to moisture distribution throughout the year. The last half of April and all of May were warm and dry, permitting relatively early planting of grain crops. Temperatures were below normal in the summer, but September and part of October saw the return of warm, sunny weather for harvesting and field

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[7] An increase of 17 percent cropped land and a decrease of 5 percent total farmland between 1966 and 1986.

TABLE 4.4

COMPARATIVE CROP YIELDS FOR NIAGARA REGION AND THE LOCAL COMMUNITY

CROP	Reported Yields/Acre			
	ONTARIO MINISTRY OF AGRICULTURE AND FOOD*			PHASE 4B SURVEY RESPONSES (1985)
	Niagara (1985)	5 Year Average (1981-1985)	Southern Ontario Region (1985)	
Hay (tons)	3.2	3.2	3.6	2.6
Grain corn (bu)	87	78	114	89
Silage Corn (tons)	11.5	11.5	14.2	11.9
Winter Wheat (bu)	53	37	68	66
Oats (bu)	63	52	73	79
Barley (bu)	60	50	68	67
Mixed Grains (bu)	64	51	75	79
Soybeans (bu)	30	29	38	32

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* Ontario Ministry of Agriculture and Food. 1986. 1985 - Agricultural Statistics for Ontario, Publication 20.

work.[8] These conditions resulted in Niagara Region grain crop yields that averaged considerably above the 5-year averages for 1981-1985 (Table 4.4). Hay, silage corn and soybeans for the Region were comparable to the 5-year average yields.

Average yields/acre were calculated for the 43 farmers who responded to the questionnaire survey. Wide variations in crop yields were reported. For example, reported grain corn yields ranged from 51 to 130 bu/ac, winter wheat from 31 to 90 bu/ac and oats from 49 to 100 bu/ac. An average yield was calculated for each crop (see Table 4.4).

The O.M.A.F. reported crop yields for Niagara Region are all considerably lower than those reported for Southern Ontario except for hay and silage corn. The average reported yields for small grains (winter wheat, oats, barley and mixed grains) in the local community are comparable to the yields realized in Southern Ontario in 1985. Average reported yields for hay, grain corn, silage corn and soybeans are considerably lower relative to yields in the Southern Ontario Region.

An evaluation of the reported crop yields using the soils and drainage maps indicates that better yields are generally experienced on the lighter textured and better drained soils. For example, relatively high yields were consistently reported from farms located just north of the Welland River where there are lighter loam textured surface soils with random or systematic tile drainage in the depressions. There, yields are substantially higher than those reported from farms just west of the site in an area of poorly drained soils with no tile drainage. A relationship between soil characteristics and crop yields was less apparent north of Highway 20 because of the distribution of reporting farmers. However, higher yields were generally reported for areas where Class 2 soils and/or tile drainage were present.

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[8] Ontario Ministry of Agriculture and Food. 1986. 1985 - Agricultural Statistics for Ontario.

Survey respondents with farm headquarters in the local community reported the following crops in 1985:

Crop Type	Proportion Sold	Proportion Fed to Stock
hay	- 11%	89%
grain corn	- 32%	68%
silage corn	- 0%	100%
winter wheat	- 99%	1%
oats	- 30%	70%
barley	- 56%	44%
mixed grain	- 0%	100%
soybeans	- 100%	0%

Winter wheat and soybeans are mainly grown for cash crop purposes. Fifty-six percent or less of the small grain crops other than wheat are sold, attesting to the many livestock or mixed farming enterprises that operate within the local community. Only a small proportion of the hay is sold.

The majority of the crops are sold within the Niagara Peninsula. Much of the hay and small grains are sold to local farmers. Grain corn is sold mainly to Niagara Grain (Smithville), Vineland Feeds (Vineland) and Peninsula Grain (Wellandport); the winter wheat to the Canadian Wheat Board through Peninsula Grain (Wellandport) and Lincoln Feeds; the barley to Vineland Feeds and Peninsula Grains; the oats to Niagara Grain and Peninsula Grain and the soybeans through Peninsula Grain, Dunnville Co-op and local agents.

4.3.9 LIVESTOCK AND POULTRY PRODUCTION

The estimated type and numbers of livestock and poultry within the local community in the summer of 1986 are summarized in Table 4.5.

TABLE 4.5

1986 LIVESTOCK AND POULTRY POPULATION WITHIN THE LOCAL COMMUNITY

	Total Number
Dairy Cows	1,173
Dairy Cows (less than 1 year)	387
Replacement Heifers (older than 1 year)	407
Beef Cows	264
Beef Calves (less than 1 year)	135
Replacement Heifers (older than 1 year)	47
Feeder Cattle	1,929
Bulls	10
Sows	204
Boars	11
Replacement Gilts (young sows)	32
Pigs (less than 2 months)	735
Feeder Pigs (older than 2 months)	4,112
Layer Hens	153,861
Chickens (broilers and roasters)	513,156
Turkeys	72,900
Horses	63
Veal	553
Goats	298
Sheep	151
Rabbits	182
Other Poultry (pullets, ducks, geese, quail, and pheasants)	113,397
Fur (fox, chinchilla)	780

Source: Phase 4B (1986) farm questionnaire survey and windshield survey, and Phase 4A (1984) livestock inventory.

Relative [illegible] crop productivity it is more difficult to establish comparative productivity figures for the livestock enterprises in the local community, due partly to the confidential nature of agricultural marketing board production figures for small geographical areas.

Information on egg production within the study area and the Niagara Region, obtained from the Egg Producers Marketing Board, are summarized in Table 4.6. Twenty-seven percent of the Region´s production is within the local community. Comparing the local community´s figures with West Lincoln´s, it is calculated that 75 percent of West Lincoln´s production comes from the seven operators located in the local community. These operators representing 44% of West Lincoln operators, are somewhat larger than operations in West Lincoln as a whole.

In all of Ontario, there are 789 holders of egg production quota.[9] The Niagara Region´s 46 producers represent almost six percent of that number. Seven of these quota holders are located in the local community.

By contrast, 150 of Ontario´s 740 chicken producers - or 20 percent - are located in the Niagara Peninsula; this represents the highest regional concentration of Ontario production.[10] Eleven of these producers are located in the local community.

The proportion of Ontario turkey producers situated in the Niagara Region is relatively high. Of the seven geographical districts defined by the Turkey Producer Marketing Board in Ontario, Niagara Peninsula Districts contain 39 or 25 percent of Ontario´s producers. These producers marketed 18 percent of the turkey produced in Ontario in 1985.[11] There are four turkey producers in the local community.

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[9] Personal communication, John Wyne, Egg Producers´ Marketing Board November 14, 1986.

[10] Personal communication, Errol Lashley, Chicken Producers´ Marketing Board.

[11] The Ontario Turkey Producers´ Marketing Board, Annual Report, 1985.

TABLE 4.6

NUMBER OF QUOTA HOLDERS AND LAYING HENS IN THE NIAGARA REGION

Location	No. Quota Holders	No. Laying Hens	Proportion of Laying Hens (%)
Local Community	7	153,861	27
West Lincoln	18	204,753	36
Niagara Region	46	575,419	100

Source: Egg Producers Marketing Board, Mississauga, November 14, 1986 and January 20, 1987.

The number of milk producers and volume of milk produced on a county basis is available for the dairy year 1985-1986.[12] In Niagara North, which includes West Lincoln Township, 150 producers marketed 32,509,000 litres. These figures represent 7 percent of the 2227 producers in Southern Ontario and 6 percent of the 518,740,000 litres marketed.

An estimated 6,842,274 litres[13] of milk were produced by the 33 dairy farmers in the local community in 1986, representing 21 percent of North Niagara´s total production.

The highest proportion of survey respondents (65 percent) within the local community sell some kind of beef animal (finished or feeder beef cattle, culled cows, or veal). Reported numbers of beef animals sold ranged from 3 to 70 for many of the farms.

Nine respondents to the questionnaire reported selling 6458 hogs in 1985, an average of 1292 hogs per producer. These are large hog operations compared to the 488 hogs on average marketed by 188 producers in all of Niagara Region in 1985.[14]

4.3.10 FARM INCOME AND EMPLOYMENT

The agricultural economy of the local community is described below in terms of the reported gross farm sales and the farm employment generated by the operations headquartered in the local community.

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[12] The Ontario Milk Marketing Board Dairy Statistical Handbook, 1984-1985.

[13] Memo, The Ontario Milk Marketing Board, March 6, 1987.

[14] Personal communication, Mr. Francis, Pork Producers´ Marketing Board, Etobicoke, September 17, 1986.

During the farm survey, 54 farms headquartered within the local community provided complete information on farm product sales for 1985. Total livestock and livestock product sales generated by these farms was $6.27 million while crop sales for these farms were $0.57 million. Thus livestock and livestock products accounted for 91 percent of the total sale value ($6.84 million). Average sales per farm were $126,700 (see Table 4.7).

The 54 reporting farms operated a total of 3889 ha (9609 acres) in 1985. Average gross farm sales were $1760/ha ($710/ac). This figures varied from $8520/ha (3450/ac) for poultry operations down to $292/ha ($120/ac) for beef operations.

During the Phase 4B questionnaire, 68 farms headquartered in the local community provided farm employment data. A total of 39,180 days of employment associated with farm production were generated in 1985 by these farms. Hired labour accounted for 3 percent of this employment (see Table 4.8). Forty-three principal operators reported off-farm employment. Table 4.9 indicates that the majority of these operators worked over 32 weeks per year off the farm.

4.3.11 FARM SUPPLIES AND SERVICES

Farm respondents to the 4B questionnaires identified 127 suppliers of farm inputs (Table 4.10). Fifteen percent of these suppliers are found in the local community with Wellandport being the principal centre. Some of these are local distributors for businesses in Smithville. Thirty-nine percent of suppliers are located outside the region and the remaining suppliers are found in West Lincoln Township outside the local community and in Niagara Region. Smithville and Vineland are the principal centres for obtaining farm supplies outside of the local community.

TABLE 4.7

REPORTED GROSS FARM SALES BY 54 RESPONDENTS HEADQUARTERED IN THE LOCAL COMMUNITY

Product Type	Number of Farms* Reporting Sales	Total Sales	Percent of Total Sales	Sales Per Farm
Livestock and Related Products	44	$6,271,300	91	$142,500
Crops	26	$ 569,300	9	$ 21,900
TOTAL (selling crop and or livestock)	54	$6,840,600	100	$126,700

* Some farms have reported both types of sales so that the actual column total exceeds 54.

Source: Phase 4B (1986) survey of farm operators.

TABLE 4.8

FARM EMPLOYMENT REPORTED BY FARMS HEADQUARTERED IN THE LOCAL COMMUNITY

Category	Days of Farm Employment Per Year (Total)	Number of Jobs Full-Time	Number of Jobs Part-Time
Total	38,100	98	126
Hired Labour	1,240	1	19
Family Members	37,900	97	107

Source: Phase 4B (1986) survey of farm operators.

TABLE 4.9

OFF-FARM EMPLOYMENT BY PRINCIPAL OPERATOR

Weeks of Off-Farm Employment Per Year	Number of Operators Reporting
0	53
1 - 11	6
11 - 32	8
over 32	29
	96

Source: Phase 4B (1986) survey of farm operators.

TABLE 4.10

SUPPLIERS OF FARM INPUTS TO FARMERS IN THE LOCAL COMMUNITY

	Local Community	West Lincoln Outside Local Community	Niagara Region Outside West Lincoln	Outside Niagara Region
Total Number of Suppliers Identified	19	32	38	39
Number of Farmers Identifying Suppliers for Various Farm Inputs:				
Seed	52	13	12	8
Chemicals	37	11	8	6
Fertilizer	10	43	9	12
Fencing, Twine	39	5	15	5
Feed	16	10	35	13
Equipment	18	18	42	7
Fuel	0	10	4	1
Stable/Dairy Supplies	2	6	0	3
Builders	22	17	16	0
Trucking	3	14	14	3
Custom Work	11	9	2	4
Farm Management	0	4	2	10
Veterinarian	0	51	2	11
Artificial Insemination	0	0	0	6
TOTAL	210	211	161	89

Though relatively few suppliers are found in the local community they are used more frequently than suppliers in other areas for purchases of supplies and equipment. Services are secured from more widely distributed suppliers.

4.4 CHARACTERISTICS OF THE PREFERRED SITE

4.4.1 INTRODUCTION

The location of the preferred site has been described in Section 2.2.2 of this report. The characteristics of the preferred site lands - their soils, tenure and productivity - as well as selected characteristics of the farm operators, are described below.

4.4.2 LAND RESOURCES

Lacustrine clay soils dominate the preferred site. A silt veneer which exists on the woodlot soils has apparently been eroded from the cultivated fields, and remaining soils have a predominantly silty clay loam texture. Many poorly drained depressions have accumulations of organic matter and, occasionally, fine textured soil particles washed from the surrounding slopes (Ecologistics Limited, 1985).

The site topography is characterized by a series of interconnected, poorly drained depressions which bisect imperfectly drained soils. The poor drainage in the depressions makes cultivation difficult. Consequently, the size and shape of cultivated fields have been influenced by the location of these poorly drained depressions.

Nineteen hectares (47 acres) of land in the southwest portion of the site are randomly tile drained. The tile drainage has improved the drainage in the depressions and allowed cultivation to take place uniformly across the fields. On the south part of the site a network of surface drains provides some degree of drainage improvement.

Almost all of the on-site soils are Class 3. Soils with this rating have moderately severe limitations for common field crop production, the main limitation in this case being soil drainage. There is one small pocket of Class 2 soils (less than one hectare) at the north end of the site.

4.4.3 CHARACTERISTICS OF FARMS

The site boundary encompasses all or part of four farm units: one measuring 40.5 hectares (100 acres); one measuring 43.5 hectares (108 ac); and two measuring 20 hectares (49 acres) each. A description of these four farm operations follows:

1) Farm A - a full-time owner-operated dairy operation with 40.5 ha (100 acres) land base all of which including the farm headquarters is on site.

2) Farm B - a mixed operation comprising 34 hectares (84 acres), all of which are owned and operated by a semi-retired farmer. Twenty hectares (49 acres) are located on-site and 14 hectares (35 acres) are located south of the site. The farm headquarters are located on the site.

3) Farm C - a 20 hectare (49 acre) parcel which is part of a dairy farm (126 hectares [311 acres]) located immediately west of the site along Vaughan Road. There is an unused barn on this property.

4) Farm D - a 43.5 hectare (100 acre) parcel which is tillable but was idle in 1984. There is a non-farm tenant in the farmhouse and two abandoned hog barns on the property.

The livestock associated with the above-noted operations include: 35 dairy cows, 9 dairy cows less than one year old, 4 replacement dairy heifers and 12 replacement beef heifers.

A summary of the crops grown, other land uses and their respective proportions of the total site area in 1986, is contained in Table 4.11.

4.4.4 CHARACTERISTICS OF FARM OPERATORS AND THE FARM ECONOMY

A total of five people live in two farm households on site. Two residents are known to be over 65 years of age. No children under 18 years of age live on-site. The two families are long-term residents of their respective farms. Neither household has reported having ancestors that lived in the area.

The contribution of the on-site farm lands to the local agricultural community is reflected in the estimated gross farm revenue and employment generated. The actively used farmland generates an estimated $72,000 in gross farm revenues. An estimated 270 weeks of employment are generated by farms headquartered on-site.

4.5 CHARACTERISTICS OF THE PREFERRED ACCESS ROUTE

The OWMC proposed access route runs south from the QEW sixteen kilometres along Regional Road 24 to Highway 20 then west for five kilometres to the western limit of the proposed site (see Figure 2.1). The section of the

TABLE 4.11

LAND USE ON-SITE - 1986

LAND USE	HECTARES	PERCENTAGE OF SITE AREA
Hay	40	32
Corn	10	8
Barley	4	3
Oats	2	2
Fallow Land	15	12
Pasture	7	6
Idle Land	34	27
Forest	9	7
Wetlands	1	1
Buildings	2	2
TOTALS	124 ha	100%

Source: Phase 4B (1986) farm survey and windshield survey.

access route between the QEW and Vineland is located below the Niagara escarpment. Along this section, soil and climatic conditions are particularly favourable for the production of tender fruit crops relative to other route sections located above the escarpment. Agricultural land along the access route below the escarpment has been designated as "good tender fruit" or "good grape" areas within the Official Plan (Regional Municipality of Niagara, 1981).

A total of 78 farmed properties border the access route. Of these, 40 are farm headquarters. Seventy-five percent of the properties are owner-operated while the remaining 25 percent are worked by tenant farmers. As is common in the area, many farmers rent several scattered parcels. Nine local farm operators each farm more than one property abutting the access route.

There are 1028 hectares (2539 acres) of farm land in properties abutting Regional Road 24 and 667 hectares (1648 acres) in properties adjacent to Highway 20. While there is a considerable mix of farm types represented on these properties, fruit production, cash crop and dairy farms are dominant activities (Tables 4.12 and 4.13).

Forage, small grain and row crops predominate. Due to this variety of crops, most operators must move several types of large equipment, including combines and hay wagons down portions of the access route. Approximately 21,000 kilometres a year are travelled by farm machines. The average distance travelled per year per farm is 270 kilometres.

The north section of Regional Road 24 runs through an area of intensive fruit production containing 27 orchard and vineyard properties. Thirteen of these are clustered together north of the Town of Vineland. Most of the fruit farms produce cherries, peaches, grapes and other tender fruits. One property combines a large poultry operation with an orchard.

TABLE 4.12

NUMBER OF OPERATIONS ALONG THE PREFERRED ACCESS ROUTE

TYPE OF OPERATION	REGIONAL ROAD 24 NUMBER	HIGHWAY 20 NUMBER	TOTAL NUMBER
Dairy	4	7	11
Poultry	2	3	5
Poultry/Fruit	1	--	1
Hogs	1	--	1
Beef	--	1	1
Beef/Fruit	1	--	1
Horse	1	1	2
Fruit Only	25	--	25
Cash Crops	16	8	24
Nursery	1	--	1
Idle Properties	5	1	6
TOTAL	57	21	78

Source: Phase 4B (1986) and 4A (1984) farm surveys.

TABLE 4.13

ESTIMATED LIVESTOCK AND POULTRY POPULATIONS ALONG THE PREFERRED ACCESS ROUTE

LIVESTOCK OR POULTRY TYPE	REGIONAL ROAD 24 NUMBER	HIGHWAY 20 NUMBER	TOTAL NUMBER
Dairy Cattle	129	241	370
Poultry	136,000	39,000	175,000
Beef Cattle	53	20	73
Hogs	100	15	115
Sheep	15	--	15
Horses	36	10	46
Animals Pastured Along the Access Route	83	167	250

Source: Phase 4B (1986) and 4A (1984) farm surveys, and Phase 4A (1984) livestock inventory.

As most of the fruit producing operations are on single properties which contain the headquarters, equipment movements along Regional Road 24 from these farms are minimal. Tractors, sprayers, fruit wagons and harvestors make frequent trips on short sections of the road during specific times of the growing season such as during harvest.

Roadside stands are associated with several of the orchard and vegetable operations. The number of customer stops reported during peak fruit season range from 10 to 250 stops per month per farm.

To the south of Vineland on Regional Road 24 are found livestock, fruit and cash crop operations. The livestock farms include four dairy, two poultry, a horse, a hog and a small beef operation.

Five local farmers work at least two properties each along Regional Road 24. These five operators move farm machinery approximately 2800 kilometres a year along the access route.

West of Regional Road 24, Highway 20 runs past 21 properties comprising seven dairy farms, three poultry operations, one beef farm, one horse farm, one idle farm property and eight cropped properties.

The dairy and poultry operations are serviced by feed, livestock and other service vehicles on a regular basis. An average of 135 service vehicle stops occur at each livestock operation annually.

Several of these livestock intense farms grow crops for feed or combine some cash cropping with their livestock production. Approximately 3600 kilometres a year are travelled on Highway 20 by farm equipment used in field operations. Of this total, 3400 km are travelled by four operators who own 10 properties on Highway 20 and make substantial use of the Highway. As well as cropping 10 abutting properties, all four operators do custom work in the area; therefore, use of Highway 20 is estimated to be greater than reported.

CHAPTER 5

FUTURE SCENARIO FOR AGRICULTURE

5.1 INTRODUCTION

The purpose of this chapter is to provide the broad outline of the probable future conditions of agriculture that may apply in the study area during the lifespan of the facility. It is based on assumptions regarding underlying trends and development forces. While we consider these assumptions to be reasonable, they are not based on detailed investigations or forecasting models. Therefore, the future scenario provides a very general estimate of future conditions and is considered to be reasonable for purposes of analysis.

5.2 DISCUSSION

In this section, the future scenario is discussed in terms of a number of key descriptors. Local trends are reviewed and assumed changes are discussed. The information and discussion about trends is based in large part on background information in Chapter 4, "Existing Conditions." Trend data from the Census of Agriculture are tabulated in Appendix C.

5.2.1 LAND USE

Land use patterns will have an overriding influence on the utility and attractiveness of the land base for agricultural use. In particular, the continuation of most agricultural activities in the area depends on the availability of sufficiently large parcels of land to permit efficient field work and the opportunity to assemble enough of these parcels to support a viable farm operation. Only poultry and certain specialty operations are not dependent on a large land base.

Zoning and land severance policies will largely determine whether or not future land requirements for agriculture are met. For purposes of analysis it is assumed that, with the exception of existing rural hamlets, lands in the study area will retain an "Agricultural" designation. This implies that, as proposed in the Official Plan Update, Amendment No. 8, strip development will not be allowed and that new residential subdivisions will only be permitted in a "Hamlet Community" or in "Rural" areas with adequate separation allowances to prevent future conflicts with agriculture. It further implies that severances are not likely to be allowed for rural properties if they render a property too small for an economically viable agricultural use. The concentration of residences in agricultural areas may however increase if homes are built on empty properties or permits are granted for second homes on farm properties.

The land use controls assumed above imply that agricultural land uses will continue to dominate in the study area as they have in the past. For instance, in 1986 eighty-four percent of total land area was dedicated to agriculture within the area corresponding to the former Gainsborough Township. Over the period 1966 to 1986, the farmed portion of this area and the improved farm land fell by 4% and 5% respectively while total crop land area grew by 8% (Appendix C).

5.2.2 FARM/NON-FARM POPULATION

A largely farm-based rural population facilitates ongoing agricultural activity because:

- it minimizes the opportunity for conflicting land-use practices,
- it ensures a greater awareness of and interest in the agricultural quality of the land base, and
- it provides a more extensive infrastructure of formal and informal community resources supporting agricultural work.

The number of census farms in West Lincoln has fallen from 769 to 620- a loss of 19% - between 1961 and 1986. Over the entire Region of Niagara, the number of census farms has fallen from 4732 to 3147 (a 33% loss) over the same period. In both regions, a low point was reached about 1976, with some recovery over the next 10 years.[15] Unlike the number of census farms in West Lincoln, the number of households has been increasing (from 2130 in 1971 to 2910 in 1981).[16] From 1971 to 1981, census farms as a proportion of households fell from 33% to 23%.

For the farm operators who remain in Niagara, the overall prevalence of off-farm work has changed little from 1966 to 1986. Approximately one-half of all farm operators reported no off-farm work in both years while the total days of off-farm work per farm was 112 and 107 respectively. This suggests that the proportion of farm operators relying on farm activity as their primary source of income has not changed.

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[15] A change in definition of the census farm may have caused some of this observed decline in 1976 though the period is associated with farm closures as a result of high interest rates and other economic pressures. A census farm is one for which farm product sales are at least $2,500.

[16] Institue for Environmental Research, 1988. Information on the number of households in West Lincoln in 1986 was unavailable.

It is assumed that there will be a further decrease in the proportion of the township population that is farm-based. This will occur as populations in hamlets and "rural" areas grow. A greater proportion of rural properties that are zoned agricultural may also come to be held by and/or occupied by persons whose principal means of support is not agriculture. These persons may be ex-urbanites or ex-farmers. Many will support farm-uses of their properties as part-time or hobby farmers or by renting crop land to farmers. The increasing use of rental lands for farming is illustrated by the fact that the ratio of rented to owned lands has increased from .15 to .43 over the period 1961 to 1986 in Niagara.

Average farm size has increased in West Lincoln (44 ha in 1961 vs 48 ha in 1986). In Southern Ontario Region average farm size has been increasing at a faster rate (44 ha in 1961 vs 64 ha in 1986). The smaller increase in farm size in West Lincoln may be the result of new poultry farms which use very little land.

Consolidation of existing farm operations and technical innovation will likely cause farms other than poultry farms to increase in size. The farm sector of the population will diminish as fewer farm families work larger farms.

5.2.3 FARM/NON-FARM USE OF ROADS

The risk of accident increases and the efficiency of field work falls if farm vehicles encounter significant traffic interference along township and regional roads. For this reason future changes in use of roads in the impact zone must be considered.

It is assumed that the farm vehicle use of roads will not diminish and that it may increase if:

- the trend to multi-property farm operations continues as a result of the expansion of commercial farm operations by the purchase or rental of properties at a distance from the headquarter property.

- more specialized operations offering farm gate sales to local and regional markets are established.

Moreover, it is assumed that general non-farm use of roads in the study area will increase with local and regional demographic and economic growth. Therefore, the potential for interference in the future will increase.

5.2.4 LAND VALUES

Farmers must have access to land at purchase or rental rates that are affordable relative to expected returns from agriculture if they are to remain in agriculture.

Rental rates are currently relatively low in the study area at an average of $37/ha in 1986 compared to an average of $101/ha in Southern Ontario.[17] This is consistent with low levels of demand for land due to the moderate quality of soils in the area and the depressed state of markets for certain farm products. It is assumed that rental rates will remain low in the future relative to other more productive areas in the province.

The purchase price for land will depend on existing and potential land uses, on a variety of property amenities such as accessibility, drainage, improvements, etc. Given the proposed agricultural zoning, it is assumed that the major source of demand will be the farm population and the growing rural non-farm population.

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[17] 1986 Census, see Section 4.3.6.

The non-farm sector of the market will likely be interested in smaller parcels and will base their bid price for land on factors other than agricultural productivity; examples of these being the price of urban residential real estate, access to highways, and the rustic or natural character of a property.

Productivity and earning potential will be the dominant determinants of value for farm buyers. Bid prices for larger parcels will therefore be consistent with profitable agricultural operations over the long run.

5.2.5 FARM PRODUCT PRICES

Farm product prices and related agricultural support policies determine the on-farm profitability of agricultural work and thus, the viability of operations. At various times, prices and policies will favour certain types of operations over others. For example, the establishment of marketing boards to set production quotas and prices has enhanced the viability of poultry and dairy operations.

It is assumed that farm prices and/or farm policies will generally provide a long-term prospect for agriculture that is sufficiently optimistic to sustain ongoing farm activity. In particular the types of operations that are currently supported by marketing boards will continue to be protected and will prosper in the future. Their expansion in the study area may occur in response to increases in quota or as a result of the importation of quota held by farmers attracted to the area by relatively low land prices or locational advantages. An upward trend has been dramatic for poultry in West Lincoln with a 314% growth from 1961 to 1986, six times the rate of growth for the province. While poultry operations are not dependent on good crop land, dairy operations do need cropland to support a forage rotation. Local conditions are suitable for dairy operations; these have shown some decline in West Lincoln -

32% fewer cows in 1986 than in 1961 - while dairy cow populations have fallen by 55% throughout the Southern Ontario Region over the same period.

The relative mix of cash cropping, beef, hog and specialty operations that are not sheltered by strong agricultural marketing boards will depend largely on market forces.

Given soil limitations in the area, an improvement in grain prices will likely encourage commercial operators to install tile drainage on owned land where this has not yet been done.

Forty-six percent of cropland was dedicated to tame hay in West Lincoln in 1986 compared to 10% for Southern Ontario Region. While the proportion of cropland in hay has been falling in West Lincoln and throughout Southern Ontario Region, the local decline, at 25%, is considerably less than the decline for the larger area at 57% (1966 to 1986). It is expected that crop rotations with forage will continue to dominate locally due to the inability of soils to sustain yields with continuous row cropping. Wheat and corn acreages have however shown a four to five-fold increase from 1966 to 1986 in West Lincoln Township and will remain important especially if prices improve.

Certain rural non-farm residents will engage in cash cropping, hobby or specialty operations on a part-time basis. These activities will be pursued in part as recreational activities and will be less subject to economic constraints. Their presence may cause some shift away from commercial-scale livestock based, mixed farming systems in the area.

5.3 SUMMARY

Salient features of the future scenario assumed for agriculture in the study area are:

- The overall character as a rural agricultural community will remain intact.

- The overall level of agricultural production in the area will not fall.

- Land fragmentation due to property severance will be minimal in agricultural zones.

- Most non-farm buyers interested in rural properties will prefer smaller properties.

- As economic conditions permit, improvements such as land drainage will be made by full-time operators mainly on owned cropland and less so on rented land.

- A livestock-based, mixed agricultural system will continue.

- Small grain and forage-based crop rotations will continue to dominate on cropland in the area due to limitations posed by fine textured clay soils.

- Small-scale mixed commercial operations will diminish in number and additional specialty, part-time or hobby farms may be started particularly on smaller properties.

The major sources of uncertainty in this scenario relate to farm product prices and to policies regarding land use. Shifting farm product prices will influence the mix of crop and livestock activities in the area though not the overall agricultural orientation of the area. On the other hand, any decision to relax the agricultural land use controls in the study area could have a marked influence on the projected agricultural character of the community.

CHAPTER 6
COMPARABLE FACILITIES

6.1 INTRODUCTION

The intent of this chapter is to present a summary of available information about impacts of similar facilities on agricultural resources and farm communities surrounding them. Also presented is information about impact management programs or other mechanisms that have been used to address problems associated with facility operations.

Experiences of waste treatment facilities similar to those proposed by OWMC would be most helpful for anticipating the types of impact that one might expect from the OWMC facility. Since relatively few hazardous waste treatment plants are currently operating in North America, hazardous waste treatment facilities in Europe and other North American industrial facilities were included in this analysis. Each facility mentioned is located in a rural or agricultural community and is associated with some form of environmental risk.

Seven facilities were considered. Information varies considerably in detail among facilities due to differences in available documentation and access to primary data (e.g. from personal interviews).

6.2 LOCATION AND DESCRIPTION OF COMPARABLE FACILITIES

The first three facilities are hazardous waste treatment plants in Ontario, Louisiana and Germany (Table 6-1). These are the most comparable to those proposed by OWMC. Three Mile Island, which is also examined, is not considered a directly comparable facility; however, a discussion of this nuclear power generating station is included because of the detailed investigations of agricultural impacts that occurred following the accidental release of radioactivity in 1979. Three heavy industrial plants located in or near the Niagara Peninsula are included because their emissions have been or currently are a concern to surrounding agricultural communities.

A brief statement highlighting the background of each of the facilities is provided as a context for the discussions in the remainder of the chapter.

Tricil Limited - The Tricil facility near Sarnia in Moore Township is one of the few hazardous waste treatment and disposal sites operating in Canada. It is located in a cash crop farming area approximately 12 km southeast of Sarnia.

Area farmers interviewed reported that, under previous management (circa 1960), on-site disposal operations more resembled a dumpsite than a treatment plant.[18] They reported frequent fires in the open disposal pits and a stench from the landfill areas.

Following Tricil's acquisition of the property in 1973, operations improved and are now in compliance with conditions prescribed by the

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[18] Results of farmer survey conducted by Ecologistics Limited in the Tricil vicinity, May 21, 1987.

TABLE 6-1

INDUSTRIAL FACILITIES - GENERAL DESCRIPTION

FACILITY NAME	LOCATION	TYPE OF OPERATION	MAJOR CONTAMINANTS OF CONCERN	INFORMATION SOURCES
HAZARDOUS WASTE TREATMENT PLANTS				
Tricil Limited	Sarnia	Hazardous and non-hazardous waste treatment and disposal facility	Residual organic compounds	Literature, Agency personnel, Farmer interviews
Rollins	Baton Rouge, Louisiana	Hazardous waste treatment and disposal	Residual organic compounds	Site visit report, IER; Phone contact with area rancher
HIM (Hessian Industrial Waste Management Company)	Biebesheim, West Germany	Hazardous waste treatment and disposal	SO_2 and heavy metals	Literature, Site visit report, Ecologistics Ltd.
NUCLEAR POWER PLANT				
Three Mile Island	Three Mile Island (Harrisburg), PA	Nuclear power generation	Radioactive Compounds	Literature,
NIAGARA-AREA INDUSTRIAL PLANTS				
INCO	Port Colborne	Nickel refinery	Nickel, Copper Cobalt	Literature, Agency personnel
Electric Reduction Company (ERCO) (Currently: International Mineral and Chemical Company - IMC)	Port Maitland (Dunnville)	Fertilizer manufacturer	Fluorides, SO_2	Literature, Agency personnel
Nanticoke Industrial Complex	Nanticoke	Electric power generation (Ontario Hydro) Oil refinery (Texaco) Steel Mill (Stelco)	SO_2, NO_2, Fe, other heavy metals	Literature, Agency personnel

Ontario Ministry of the Environment (Giffels Associates Limited, 1984). In 1982, a new high temperature incinerator was installed which reportedly burns waste more effectively and has reduced odours.

Rollins - This facility began processing hazardous waste in 1971. A small town borders the facility on one side, and on the other, a 1250 acre beef farm. No other farm operations are located within five km of the Rollins plant.[19]

As recently as the early 1980's, waste disposal on-site was achieved by `landfarming' in which waste residues were applied to the soil surface and worked in by regular cultivation. Enforcement by the State and the U.S. Environmental Protection Agency has increased within the past two years, resulting in an improvement in local air quality.[20]

HIM - This hazardous waste management company has operated an incinerator at Biebesheim since 1981. An associated physical/chemical plant is located in an industrial area near Frankfurt, and landfilling is carried out 80 km from Biebesheim in a wooded setting.

The incinerator at Biebesheim is located in a rural area although numerous chemical and other industries are scattered around the fringe of Biebesheim. Agricultural land uses prevail in the area with cropping at the perimeter of most industrial properties, including the incinerator property. Sugar beets, corn, winter wheat and carrots are grown commercially in the area and community garden plots were also noted in the vicinity.[21]

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[19] Personal communication with farm operator, July 14, 1987.
[20] Based on site visits by I.E.R., November, 1986.
[21] Based on site visits by Ecologistics Limited, January 7, 1985.

Three Mile Island (TMI) - This nuclear power generating station is best known for the major accident in 1979 which released radioactive materials to the environment. TMI is located in a region of rich, fertile valleys where dairy and beef operations predominate. Agriculture contributes substantially to the area's economy (Gears *et al*., 1980).

Short and long-term effects to agriculture resulting from this accident have been investigated (Pennsylvania Department of Agriculture, 1979; Gears *et al*., 1980). Impacts to agriculture were studied up to 40 km from the site.

INCO - This nickel refinery began operations in 1918 near the town of Port Colborne. Land use surrounding the site is primarily mixed farming, with pockets of wetland and cultivated organic soils.

Most contaminants were emitted prior to 1960 (Frank *et al*., 1982). Nickel (Ni) concentrations in soils up to 3 km northeast from the site have remained extremely high, ranging from 500-1500 mg/kg in mineral soils (normal background levels are 16 mg/kg), and 600-6455 mg/kg in organic soils. This has resulted in vegetable production difficulties in cultivated organic soils located 1 km away from the refinery.

The INCO facility has not operated as a smelter for the past several years; rather, smaller scale cobalt refining and production of a nickel-zinc alloy product occurs on-site.[22] Cobalt concentrations in the soil were near normal for organic soils in Canada (Frank *et al*., 1982).

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[22] Personal communication with Tom Peters, (retired INCO agriculturalist) October 20, 1986.

Port Maitland - The ERCO plant began producing single and triple superphosphate fertilizers in 1961. The primary pollutant byproducts of this industrial processes are hydrogen fluoride and sulfur dioxide (Hall *et al.*, 1968).

Mixed crop and livestock farms characterize agriculture in the vicinity of this site.

Reports of pollutant injury to crops and livestock were common until a Royal Commission held public hearings in 1968. The Commission heard expert and farmer testimony on impacts to agriculture and the environment. Some abatement of fluoride emissions was achieved in 1967 following installation of pollution control equipment. Changes in impacts to agriculture following installation of this equipment have not been documented.

In 1968, the ERCO plant was purchased by the International Mineral and Chemical Company (IMC). IMC continued production of phosphate fertilizers until mid-1984, when production ceased. Consequently, stack emissions of fluoride also ceased. Fugitive dust emissions from the site and from the settling ponds are still a low level source of fluorides (M.O.E., 1986a).

Nanticoke Industrial Complex - In 1973, Ontario Hydro began construction of one of the world's largest coal-fired thermal power plants near the rural village of Nanticoke on the north shore of Lake Erie. It was fully operational by 1978, at which time a Texaco oil refinery, with a capacity of 160,000 barrels/day, also came on-stream. By 1980, Stelco began production from its mill which has a design capacity of over one million tons of slab steel (M.O.E., 1986b).

Many beef and dairy farms are located in the vicinity of this industrial complex (M.O.E., 1986b).

A unique feature of the Nanticoke complex is an extensive biomonitoring program in the surrounding area. It was initiated in the pre-construction phase to provide baseline data. In subsequent years, direct monitoring of air emissions as well as a variety of biomonitoring programs have been conducted in order to assess actual and potential changes to the environment (M.O.E., 1981; M.O.E., 1986b).

6.3 FACILITY IMPACTS ON SURROUNDING AGRICULTURAL LAND AND FARM COMMUNITIES

The nature of impacts that industrial facilities create in surrounding agricultural areas is dependent on a number of factors:

- characteristics of the facility (type, concentration and form of contaminants emitted, etc.).

- sensitivity and response of receptors to the contaminants; for example, a market garden will generally be a more sensitive receptor than will pasture.

- the extent to which environmental standards and regulations were in place and enforced during the period in which the facility operated.

- the perceptions that area residents have of the facility's impact based on direct experience, media coverage, or other publicity.

The interrelationships of these and other factors result in a set of impacts which are unique to each facility. However, impacts which are common to a number of the facilities include injury to crops and livestock, land use change, farm population out-migration, land value changes and consumer response issues. Each of these are discussed in the sections which follow.

6.3.1 INJURY TO CROPS AND LIVESTOCK

Concerns about contaminant injury to crops and/or livestock have been raised by local residents at each of the sites. In some instances, reported injury from facility operation has been confirmed and in other instances, disproved. Evidence of injury, however, has little or no direct bearing on the OWMC facility since many characteristics of these facilities differ considerably from those of the proposed facility. Nevertheless, the information is useful since it places other impact information into context.

Tricil Limited - Eight farm operators interviewed within 1-4 km of Tricil felt that air and water pollution is occurring as a result of facility operation. However, they also expressed some frustration at not being able to `prove´ this assertion. Consequently they all report uncertainty about the long-term effects on groundwater and the environment generally.

Three of the respondents mentioned specific crop injury symptoms including discolouration of white bean leaves following several days of wind from the direction of the facility, and symptoms similar to herbicide spray-drift on spring grain. These symptoms occurred 5 to 10 years ago on fields located up to 3 km from the site. An adjacent farmer wondered whether the death of several large trees could be associated with the operation. One respondent reported that within the past 15 years, several cattle had died after drinking water from a channel containing surface water runoff from the site. No independent verification of these reports was available.

These individuals felt that they had no one to turn to for an independent evaluation of the situation causing concern.

Rollins - The rancher located next to the Rollins plant and to an adjoining abandoned disposal site reported that 40 head of cattle died in the late 1960's after drinking leachate that had run onto his property from the abandoned site. He reported no emission effects on crops and that previous problems with leachate and odours had eased since new management is cleaning up the site.[23]

HIM - Local government officials reported no impacts to agriculture as a result of facility operations. A soil and vegetation monitoring program in the vicinity of HIM also provided evidence of no impacts to-date to agriculture (see Section 6.4).

TMI - The Pennsylvania Department of Agriculture (PDA) conducted a number of studies in the months following the accident at TMI to determine whether any reports of injury to crops or livestock could be attributed to TMI. Of 96 farms within eight km of the site with between 9,000-10,000 head of livestock, 11 reported unusual herd health problems (Gears et al., 1980). Such problems included conception difficulties in cows, stillbirths in livestock and deaths of kitten litters. Local veterinarians indicated that none of these problems were attributable to TMI.

Similarly, another study (conducted in May, two months after the accident) of 100 livestock owners located within eight km of TMI indicated that 95% of the owners reported no unusual animal health problems. Any problems reported were associated with diseases or nutritional deficiencies that were common to the area (PDA, 1979; 1980).

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[23] Based on site visit by I.E.R., November, 1986.

It was noted by Gears _et al_. (1980) that difficulties were encountered in establishing what constitutes unusual animal health problems. Certain livestock diseases had apparently not generated enough concern within the livestock industry to warrant systematic documentation of morbidity and mortality. Therefore, "unusual" or "abnormal" cases were diagnosed subjectively, based on the opinions and experiences of the local veterinarians.

Any problems with vegetation reported by area residents as being attributable to TMI have been diagnosed as unrelated to the accident (PDA, 1980). Reports of weakened pear trees were linked to the virulence of fire blight (a bacterial disease) throughout the state in 1979, and dying branches on other kinds of trees were considered to be related to outbreaks of the locust leaf miner and anthracnose disease (Gears _et al_., 1980). Few crops were direct receptors of radiation because of the time of year at which the accident occurred.

The highest calculated exposure level of radiation in the surrounding area was 100 millirem, or less than 1/1000th of what could be expected to cause clinically detectable effects in the exposed animal population. The low exposure, the absence of a geographic pattern for reported problems and their diagnosis as commonly occurring problems, led the investigators to the conclusion that there was no relationship between the TMI accident and reported incidents of disease or other impact to crop and livestock health.

INCO - The direct effects of Ni fallout from the INCO plant in Port Colborne were most clearly evident in a market gardening area located 1 km northeast of the site. Beets, cabbage, celery, lettuce and radish exhibited symptoms of Ni injury including stunted roots and tops, chlorosis, necrosis and discoloured roots. In addition, some plant stalks and midribs were twisted, and leaf crops failed to form compact heads.

With the exception of lettuce which produced a normal yield on soil with 1300 mg/kg Ni, all crop yields were reduced. No marketable crops were realized at a Ni concentration of 4800 mg/kg (Frank et al., 1982).

Concern about metal contamination of forages was apparently raised by a livestock operator located about 2 km downwind from the site; however, no documentation about this complaint is available.[24]

ERCO, Port Maitland - Extensive testimony was presented to the Royal Commission regarding effects on soils, crops and farm animals of fluoride and sulphur dioxide emissions from plant operations (Hall et al., 1968).

Crop specialists determined that observed crop injury was attributable to the ERCO plant. This was particularly true for barley, where adverse effects were evident in fields up to 4 km from the plant. Hay and the leaves of some varieties of corn showed fluoride injury symptoms, but there was no consistent evidence of abnormally high levels of fluoride in ripened cereal seeds (Hall et al., 1968).

The Commission did not attempt to correlate the concentration of fluoride emissions with damage to crops, but rather stated that ERCO was emitting 200 lbs of fluoride per day well into 1967 despite the installation of air pollution control equipment. The "demonstrable evidence of damage to livestock and vegetation" resulted in compensation payments being awarded through arbitration to numerous farmers (see Section 6.4) (Hall et al., 1968).

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[24] Personal communication with J.W. Potter (Plant Pathologist, Agriculture Canada Research Station, Vineland), October 23, 1986.

Effects on livestock located up to 5 km downwind were also identified. Varying degrees of fluorosis in dairy herds as a result of ingesting contaminated pasture grass and hay were documented. In at least two herds, 10-30 percent of the herd exhibited lameness and urinary values of 20-60 parts per million (ppm) fluoride were discovered. In a few animals, gross abnormalities, loss of weight, decline in milk production and urinary values of 60-80 ppm fluoride were documented. Evidence was also presented to support the contention that bees may have been affected by fluoride concentrations (Hall *et al*., 1968).

Since closure of the IMC plant, low levels of radioactivity originally contained in the primary processing material have been detected in the settling ponds and a nearby landfill. Dust from these areas has recently raised human health concerns.[25] However, testing for fluoride and uranium in forage and indigenous maple foliage in 1984 and 1985 at M.O.E. vegetation monitoring sites revealed that "emissions from IMC were not responsible for the problems observed" on two properties where the owners complained of injury to vegetation (M.O.E., 1986a).

Nanticoke Industrial Complex - Periodic complaints have been received by the M.O.E. and Ontario Hydro from the farm community about emission effects on the growth patterns and productivity of spring grain. These isolated incidences have to-date been attributed to cool, wet spring growing conditions (on heavy clay soils) rendering "nitrogen unavailable for plant growth" (M.O.E., 1987).

In 1985, an extensive monitoring program was carried out jointly by the Ministry of Agriculture and Food and the Ministry of the Environment at 15 sites on transects extending 25 km north and northeast from the site. Samples of barley foliage were analyzed for 22 inorganic elements. Various soil chemistry parameters were analyzed and physical characteristics of soils and crops were documented. Historical SO_2 data were analyzed to detect any correlations between barley yields and SO_2 concentrations. Results of this monitoring program confirmed that the principal factor affecting barley yield was the spring planting date. No correlations were found between contaminant levels and barley yields (M.O.E., 1987).

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[25] Personal communication with H. Bentley (OMAF Agricultural Representative, Haldimand County), October 20, 1986.

6.3.2 LAND USE CHANGES IN THE VICINITY OF COMPARABLE FACILITIES

The extent of changes in land use surrounding these facilities varies, although in general, it appears that the agricultural character is being maintained.

Some agricultural land use changes have occurred in the vicinity of Tricil, but they appear to conform with the prevailing changes in Moore Township as a whole. There used to be more dairy farmers in the area, but many of the younger generation have chosen to work in the chemical plants around Sarnia.[26] A mixed farming system prevailed in the past, but has given way to cash crop farming. These trends are consistent with Census of Agriculture (1961-1981) data for the Township. No other industries have been established in the area.

The HIM facility is located in the midst of a transitional agricultural setting where much of the land is publicly owned and industries are moving in. Farming in this area is done largely on a rental basis.[27] No indication was given of the rate at which land use changes are occurring.

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[26] Personal communication with area farmers, May, 1987.

[27] Based on site visit by Ecologistics Limited, January 7, 1985.

In the case of TMI, indications are that general municipal growth had been promoted by government in the TMI area in the 10 years prior to the accident. Following the accident, preliminary indications were that banks were discouraging new development within a eight km radius of the site (Flynn and Chalmers, 1980). Potential changes to agricultural development as a result of the accident were not identified in this report.

Farmland around the INCO site has been purchased by the company.[28] In total, six properties comprising 250 acres were purchased over a 20 year time period. They were purchased largely because of evidence of metal toxicity to agricultural crops, particularly vegetables. Currently, some of this land is rented back to area farmers for grass seed and field crops (soybeans and corn). Some of the land is also slated for reforestation. It does not appear that other industries have been attracted to this area.

Land use in the Nanticoke vicinity was historically agricultural prior to construction of the industrial complex in the 1970's. There is some indication that other industries have been established in the area. An M.O.E. (1985) document states that "a few smaller industries have located in the area as well." The extent to which these intrude into the agricultural community is not stated.

No information on land use changes in the vicinity of the Port Maitland site or Rollins was obtained.

6.3.3 LAND VALUE CHANGES

General information regarding changes in property value was obtained for three of the sites.

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[28] Personal communication with Tom Peters, October 20, 1986.

There seemed to be some feeling by farmers interviewed in the Tricil area that property values have been negatively affected in the vicinity, although too few farms have been put on the market to show this. One respondent who farms 1.5 km from the site centre has had his farm listed for sale in Europe for some time. He attributed failure to close two "offers to purchase" to the farm's close proximity to Tricil.

Following the accident at TMI, many people (especially those living outside the vicinity of TMI) expected real estate values to plummet. However, Flynn and Chalmers (1980) cite a local news article printed in August, 1979 which concluded that real estate had not lost value but that prices were still rising. Market conditions could change rapidly if a decision was made, for example, to start up one or both units at TMI (Flynn and Chalmers, 1980). More recent studies of trends in land values associated with TMI were not located.

Land values in the Nanticoke area appear to be ultimately dependent on what the government decides to do with 6475 ha (16,000 ac) near South Cayuga which were originally proposed for development as the Town of Townsend. Any negative property value effects caused by the industrial complex were felt to be minimal in comparison with the current general depression in agricultural land prices and the uncertainty associated with the Townsend development.[29]

6.3.4 FARM POPULATION OUT-MIGRATION

Evidence of farmer out-migration in response to an industrial facility was found in only two of these cases.

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[29] Personal communication with Harold Bentley, October 20, 1986.

In the Tricil area, no respondents were aware of anyone moving out because of the facility. Two respondents located 1.5 km from the site centre have considered moving out (one reportedly because of allergies to various dusts and odours), but attachment to place, the presence of family and currently depressed farmland prices are discouraging their moving.

In the week following the accident at TMI an estimated 60 percent (21,000) of the population living within eight km of TMI evacuated; within 24 km of TMI, 39 percent (144,000) of the population left the area because the "situation seemed dangerous". Most people returned within a week (Sills et al., 1982).

The extent to which farm family members evacuated is not clear. For those with a livestock-based enterprise, a decision to leave creates problems because of the daily care required by many types of livestock (Flynn and Chalmers, 1980).

In terms of permanent departure from the TMI area, Sills et al. (1982) report that 147 households (one percent of total households) within eight km of TMI had moved out by the end of July, 1979. Twenty-nine percent of those contacted, or less than three-tenths of one percent of all households, gave TMI as the reason for leaving. No mention was made of whether or not farm households were included among those moving out.

6.3.5. CONSUMER RESPONSE ISSUES

Negative consumer responses to food products grown in the vicinity of comparable facilities have been documented in the literature in two cases - Port Maitland and TMI.

The prime instigator of a consumer backlash to agricultural products grown in the Port Maitland area appears to have been a film aired by CBC on October 22, 1967, entitled, "Air of Death" (Hall et al., 1968). The

Royal Commission determined that "unwarranted and irresponsible statements" made by CBC about the effects of fluoride on crops and livestock created unnecessary fear and alarm among consumers.

Eight farm operators in the Port Maitland/Dunnville area experienced losses due to consumer rejection of food products. The types of products refused were primarily market garden produce - cabbage, potatoes and other vegetables. However, 10 steers taken to Kitchener for auction did not receive a bid following the auctioneer's mention that the steers had come from Dunnville. In addition, two prospective farm sales with finalized agreements fell through because buyers perceived the area as "polluted" after viewing the film. The film's reference to the "Dunnville" problem incriminated the farm community up to six km to the north of Port Maitland, "far outside the affected area" (Hall et al., 1968).

The airing of this film apparently provided an incentive to both the farmers and INCO at Port Colborne to settle outstanding grievances privately, to avoid the type of public backlash that had occurred in the Dunnville area.[30]

No cases of contaminated food products in the Tricil vicinity were encountered.[31] None of the survey respondents were aware of negative consumer reaction to locally produced food products.

In the case of TMI, consumer concern about food contamination was felt to some degree by farmers, processors and industrial users of the area's products (Flynn and Chalmers, 1980). A study of 304 full-time farmers operating within a 40 km radius of the site indicated that four percent reported economic losses during the emergency. Within 16 km of the plant, the incidence of reported loss was somewhat higher (nine percent). Sales for the most part returned to normal within the week following return of the evacuees and a news release from the Department of Agriculture about the safety of food supplies from the area.

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[30] Personal communication with Matt Valk (OMAF Senior Horticultural Crop Specialist, York County-Bradford Marsh), October 21, 1986.

[31] Personal communication with Bill Abraham (OMAF Agricultural Representative, Lambton County, retired in 1983), May 15, 1987.

The farmers most susceptible to consumer backlash appeared to be the "milk juggers" who sell milk directly to the consumer at the farm gate (PDA, 1980). Five of 13 juggers living within 40 km of TMI reported a decrease in sales; four of the five felt the sales impacts were due to the accident. Total losses reported by these four farmers were $60,000. These farmers felt that the greatest losses were incurred during the first five weeks following the accident, but six months later, estimated sales remained on average 10 percent behind the previous year´s sales.

Of a total of 24 farmers who raised and sold fresh vegetables directly to consumers, only one of them felt that sales were affected by the TMI incident. There was less concern about vegetable contamination because fresh produce was not in season at the time of the accident (PDA, 1980).

Several cases of cancelled orders for Pennsylvania milk by out-of-state dairies were reported (Flynn and Chalmers, 1980). Milk sale declines of up to 15 percent in the first two weeks were reported by one large dairy in Harrisburg. The dairy felt it necessary to advertise that they did not utilize milk from a 16 km radius of TMI, and that "they in fact, disposed of milk produced within this area." This action was apparently considered necessary in spite of the low reading of Iodine-131 in milk samples. The highest reading was 29 picocuries per litre in the month following the accident. The state´s health standard for milk is 1,000 picocuries per litre (Flynn and Chalmers, 1980).

With regard to the Rollins facility, the rancher interviewed said he has experienced no difficulty in selling his cattle at the various stockyards throughout the Southern U.S.A.[32]

6.4 IMPACT MANAGEMENT AT COMPARABLE FACILITIES

The management of facility impacts varies according to a number of factors, similar to those outlined previously in the introduction to Section 6.3. The regulatory environment and the degree to which the facility was held accountable to the public seem to strongly influence the direction taken in impact management. In general, it appears that the older facilities responded to public concerns of environmental damage by issuing compensation payments once confronted by the complainant(s), negative press and/or the threat of legal action. More recently, facilities employ a wider range of methods to manage impacts. The differences and similarities are noted in the case-by-case discussions which follow.

Tricil Limited - Farm operators interviewed in the vicinity of Tricil reported that Tricil responds relatively quickly to complaints about odours. They reported that operations causing the problem are usually shut down by the time Tricil or M.O.E. staff appear on the complainant's property. The respondents expressed some dissatisfaction with long-term solutions to odour problems, suggesting that M.O.E. should more closely regulate the operations.

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[32] Based on site visit by I.E.R., November, 1986.

At the time of Tricil's application to M.O.E. for expansion of their landfill operation in 1984 (Giffels Associates Limited, 1984), 17 conditions for mitigating environmental effects were stipulated by the Hearing Board. These requirements included: detailed monitoring of emissions, ground and surface water with reporting to the M.O.E.; daily recording of all wastes received and landfilled; and the establishment of a Liaison Committee with representatives of the local community, the township and M.O.E.[33]

Neither the local agricultural representative nor survey participants were aware of any compensation payments to farmers because of damages incurred by crops or livestock.[34]

Rollins - No information available.

HIM - Background levels of lead and cadmium were established in the Biebesheim area monitoring program prior to the commissioning of the incinerator (Steubing, 1981). Lead and cadmium levels were measured in beet, corn, lettuce, cabbage and rye grass from 60 different plots located up to 4 km from the site centre.

A follow-up study conducted by Hanewewald (1984) included sampling of rye grass tissues at 13 test locations for lead and cadmium analysis. The study concluded that "the pollution level in the exposure range of the HIM Biebesheim can be classified as noncritical."

A contaminant monitoring study conducted by Steubing (1986) between 1979 and 1985 documents changes in lead and cadmium content of soils and rye grass tissue in the vicinity of HIM. Analysis of lead content of both soils and vegetation over this time period indicated slightly decreasing levels of contamination in the area. Cadmium levels remained virtually unchanged in the plant tissue, but increased slightly in area soils. The slight increase in the cadmium content of the soil was partially attributed to the use of commercial fertilizer containing trace levels of cadmium, as well as industrial air emissions.

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[33] "Common Ground" - A newsletter published by Tricil, September, 1986.
[34] Personal communication with Brian Boyle (OMAF Agricultural Representative, Lambton County), October 21, 1986.

TMI - None of the available documentation contained evidence that mitigation or compensation measures were ever offered to anyone affected by the accident. Economic costs incurred by the agricultural community were estimated to range between $250,000 and $500,000 (PDA, 1980), none of which appears to have been reimbursed to members of the farm community. These costs included lost sales of milk sold directly from farms or purchased within 30 km of TMI and sold by one large dairy (Flynn and Chalmers, 1980), and costs incurred by several farmers who prepared to evacuate their family or livestock (PDA, 1979).

A number of issues crucial to the well-being of area residents and applicable to any large scale, industrial complex were raised as a result of the accident at TMI. Emergency preparedness of various agencies was found to be lacking. Emergency response plans were lacking and communication networks were inadequate (Flynn and Chalmers, 1980).

The issue of public participation including financial support for locally-controlled technical expertise was subsequently raised as an important part of the regulatory process. This participation is needed to develop accountability on the part of the plant managers toward their surrounding communities (Sills et al., 1982).

INCO - Following receipt of a complaint by a farmer (usually concerning crop injury), field observations were conducted by INCO personnel. Under the `Damage by Fumes Act´ (prior to the Environmental Protection Act, 1971), a farmer could invite the Fumes Arbitrator to inspect the injury. Subsequently, the company would negotiate a settlement with the farmer, based on the current value of the crop and the extent of damages.

As mentioned earlier, a total of six neighbouring properties were purchased by INCO. The following negotiating sequence was used to purchase the properties:

1) properties were appraised twice - once by a land appraiser hired by the farmer, and once by an appraiser hired by the company (the appraisers were selected from a list of qualified land appraisers approved by the company).

2) the farmer would pay for his appraiser, but then get reimbursed by the company.

3) a company representative would then meet with the farmer to discuss the appraisals and come to a suitable agreement between the two.

As much as possible, INCO tried to negotiate each case separately. With this flexibility, it was felt that farmers had considerable input into the final decision.[35]

There are apparently several outstanding lawsuits against the company although details of such do not appear to be available to the general public.[36]

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[35] Personal communication with Tom Peters, October 20, 1986.
[36] Personal communication with Dick Frank (Director, Pesticide Residue Laboratory, Guelph), October, 1986.

Port Maitland - Total compensation awards paid by the company to 58 separate farm operations for the years 1965-1967 are noted in Table 6-2. An M.O.E. staff person indicated that compensation payments to members of the farm community have not been made since 1970 as a result of lower facility emissions.[37]

In more recent years, M.O.E. has set up air monitoring and crop plots in various locations to monitor particulate fallout from the landfill and storage lagoon areas.[38] For example, a study conducted by M.O.E. (1986a) reported fluoride and uranium concentrations in soil and vegetation at a number of established plots around the IMC facility. In general, concentrations of these contaminants were lower in 1985 and in 1984, corresponding with lower emission levels in 1985 following cessation of fertilizer production.

Nanticoke Industrial Complex - As mentioned in the initial description of this complex, an extensive pre- and post-operational monitoring program of soils and vegetation has been conducted in the vicinity of the complex up to 40 km from the site centre. Within this radius, 32 plot locations have been selected for various annual environmental studies. These studies include: an annual collection of white ash foliage; an annual collection of soils from 0-5 cm and 5-10 cm; permanent white ash observation trees; permanent observation seedling trees; and annual indicator species plots. Tissue and soil samples are analysed for contaminant concentrations; visual observations of stress to vegetation in the plots are noted. Historical trends in environmental contaminant levels are thus tracked, and the program provides an early warning of potential stress to vegetation as a result of air emissions (M.O.E., 1981).

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[37] Personal communication with Ron Pearson (Supervisor, Soils and Vegetation Assessment Unit, Phytotoxicology Section), Ministry of the Environment, Toronto.

[38] Personal communication with Joyce Branston (member, Haldimand Federation of Agriculture), October 22, 1986.

TABLE 6-2

AWARDS FOR AGRICULTURAL DAMAGES - PORT MAITLAND

Year	Livestock	Field Crops and Horticulture	Total
1965	$ 47,595.64	$ 38,593.30	$ 86,188.94
1966	$ 47,628.00	$ 64,593.74	$112,221.74
1967	$ 7,608.00	$ 65,225.35	$ 72,833.35
TOTALS	$102,831.64	$168,412.39	$271,244.03

Source: Hall *et al.*, 1968.

Any studies related to air or water quality undertaken in the vicinity of Nanticoke are now overseen by the Nanticoke Environmental Committee (NEC) (M.O.E., 1985). An O.M.A.F. staff person has indicated that there has been some criticism leveled at the NEC for over-representation by industry.[39]

M.O.E. and O.M.A.F. responded quickly to concerns of area farmers regarding potential emission impacts to crop productivity by commissioning a joint spring grain study in 1985 (discussed in Section 6.3.1).

There is no evidence of compensation payments to farmers in the vicinity of Nanticoke as a result of facility impacts.

6.5 CONCLUSIONS

This chapter has summarized known agricultural impact and impact management information about six industrial facilities. Although there are considerable differences in facility characteristics and impacts, and the ways in which these impacts are managed, some general conclusions can be drawn as a result of this investigation:

- More recent facilities such as Nanticoke and HIM have established monitoring programs to assess emissions and environmental effects. Monitoring of pre-operational levels of contaminants is undertaken to establish a baseline against which impacts can be assessed. Monitoring programs may also provide early warnings of impacts.

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[39] Personal communication with H. Bentley, October 20, 1986.

- In the past, compensation has been paid to farm operators for damages to crops and/or livestock as a result of facility operations (INCO, Port Maitland). However, in more recent years with increasing environmental regulation and enforcement along with state-of-the-art facility design and operation, the need for compensation is less evident (Tricil, HIM, Nanticoke).

- Although improvements have been made in the safety of toxic waste treatment facilities, local farm operators have reported lingering doubts about the long-term environmental impacts associated with the facility (Tricil). Need was expressed for an independent, readily accessible and responsive body which could be approached for answers if there was some uncertainty about facility impacts on farm operations.

- There is more dialogue between facility management and the surrounding community through community member representation on Liaison or Management Committees (Tricil, Nanticoke).

- In each of the facilities investigated, agriculture continues to be viable in the vicinity. The HIM case is somewhat different being situated on the edge of a town and surrounded by publicly-owned land, purchased approximately 10 years before the commissioning of the incinerator. However, even in this case, cropping patterns next to the site appear to be similar to those more distant from the site.

CHAPTER 7

PREDICTED IMPACTS WITHOUT IMPACT MANAGEMENT

7.1 INTRODUCTION

This chapter presents an analysis of potential facility impacts or "net effects" once on-site measures for impact reduction are in-place. Chapter 8 discusses a range of risk and impact management measures and the extent to which they reduce risks and impacts predicted in this chapter. The discussion of impacts in this chapter is organized by impact zone:

- Site
- Local Community
- Access Roads
- Region

Impact factors have been identified which are relevant to agricultural resources in each of these zones. Under each factor, the nature and scope of the predicted impact is described using available quantitative data such as number of receptors, size of impact area and the nature and degree of changes effecting or experienced by receptors. The discussion also identifies stages during which predicted impacts are expected to occur (i.e. pre-construction, construction, operations, closure and decommissioning), and the extent to which combinations of impacts affect receptors. Where applicable, impacts of long-duration or impacts which occur in the future are described in light of conditions that were assumed for the "future scenario."

The significance of predicted impacts is evaluated using criteria outlined in Chapter 3:

- sensitivity to change
- importance of feature affected
- magnitude of effects
- frequency and duration of effects
- comparison with provincial and municipal standards and guidelines
- public and agency preferences and perceptions
- certainty of prediction.

This evaluation leads to conclusions regarding the expected severity and significance of impacts and the need for impact management.

7.2 ON-SITE IMPACTS

The predicted impacts resulting from the loss of on-site lands are discussed in this section. These impacts are identified and assessed based on the on-site farm unit characteristics, and the quality and quantity of land lost to agriculture.

7.2.1 FARM DISPLACEMENT - TOTAL DISPLACEMENT OF FARMS

Four farm properties will be acquired on-site. Of these four, two represent farm operations headquartered on-site. The land base for these two farms is owned by the operators. In total, 38 dairy cows were housed on-site in 1986. Hay and small grains were grown on-site and certain fields were left fallow or were pastured. A total of four full-time and three part-time jobs are associated with the operations, these being primarily for family members.

The larger of the two headquartered farms is located entirely on-site. It is a full-time dairy operation using 40.5 ha (100 ac). The farm family operating this farm is comprised of the operator and his wife; both are in the 55-64 year age group.

The other farm unit headquartered on-site is a semi-retirement farm consisting of 20 ha located on-site, and 14 ha located immediately south of the site. Relatively little farming activity took place in 1986 on this farm. The farm operator and his wife are both over 65 years of age.

The operator families on both the farms just described have lived in their respective households for more than 20 years, but neither of them have family ancestry in West Lincoln. In addition, neither family has identified any community groups or associations in which they are active members.

In addition to these two farms, there is a 43.5 ha (108 ac) farm property owned by an absentee landlord. This land remained idle in 1986 and two hog barns on the property were inactive. Thus, no farm employment or revenues were generated by this farm.

Another 20 ha (50 ac) parcel located on-site was farmed by an operator headquartered off-site. Loss of this parcel is discussed in Section 7.3.1 below.

The two farm operators headquartered on-site will be significantly impacted due to their physical displacement by the facility. The family operating the dairy farm in particular, must decide whether to relocate the operation or to sell the stock and seek alternative employment. The land base, which has served as the source of the family's livelihood to date, will no longer be available to them. As well, the loss of the majority of the land base on the semi-retirement farm along with its headquarters precludes the continued viability of this farm unit. The loss of the income-generating capacity of this latter farm would appear to be less significant since there is little apparent production activity currently taking place on the farm.

From the perspective of the total agricultural resources in the local community, loss of these on-site farm units will have a minor impact. The cropped land on-site represents 1.0 percent of the total cropped land of the local community. Small proportions of dairy cows (3 percent), employment (2 percent) and estimated farm sales (1 percent) will be lost with the displacement of the on-site farm operations. Community networks will not be severely affected as the farm families headquartered on-site have not been members of community groups; neither family reports ancestral ties to West Lincoln.

7.2.2 LOSS OF FARM LAND

A total of 124 ha (306 ac) of land on the proposed site will be converted from agricultural to nonagricultural uses. In 1986, 45 percent (56 ha/138 ac) of this area was cropped, predominantly with hay. Most of the remaining land was idle, in fallow, pasture or forest. All of the idle land (32 ha/79 ac) was on the property located in the northwest corner of the site. This property, owned by absentee landlords, has not been actively farmed for several years.

The proposed site is composed primarily of Canada Land Inventory (CLI) Class 3 soils, although a small pocket of Class 2 soils (less than one hectare) is located at the north end of the site.[40] The site soils are not suitable for specialty crop production. Soils with a Class 3 rating are suitable for sustained production of common field crops, although moderately severe limitations constrain the timing and ease of field operations, and restrict the range of crops that can be grown successfully. The main crop production limitations are heavy soil textures and poor soil drainage. Nineteen ha (47 ac) of land in the southwest corner of the site have been randomly tile-drained.

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[40] Based on surveys of on-site soils completed in Phase 4A. See Ecologistics Limited, 1985.

Class 3 soils, together with Class 1, 2 and 4 soils, are designated as "high priority agricultural lands" in the Food Land Guidelines (O.M.A.F., 1978). Generally, these lands are to be given priority for productive agricultural purposes when evaluating alternative land uses. Specifically, specialty croplands (e.g. fruit land, market gardens) are to be given highest priority, followed by Class 1, 2, 3 and 4 soils in descending order.

Because of the agricultural character of West Lincoln and the general presence of priority agricultural lands, an industrial facility in the Township would not be considered compatible with the predominantly agricultural land use, as well as the broadest intent of the Food Land Guidelines - the preservation of agricultural lands for agricultural purposes.

However, given the characteristics of the proposed site, the general facility siting requirements, and the agricultural quality of alternate locations considered, impacts on the loss of priority agricultural land would be minimized by this location. The loss of Class 3 land is less significant than the loss of specialty crop or Class 1 or 2 land. Considering, as well, that the total land available for agriculture in West Lincoln and the Niagara Region includes portions of idle land which can be brought into production, the impact of on-site land displacement on the local and regional agricultural economies will be negligible. The use of the site land for agricultural purposes is not critical to the well-being of agriculture in the local or the broader community.

7.3 LOCAL COMMUNITY IMPACTS

The geographical extent of the local community and the rationale for its delineation are detailed in Section 2.2.2 of this report. This area includes the on-site properties and all others within the study area used for detailed data collection in Phase 4B.

The data used in the following discussion and analysis of impacts are derived from a number of sources as outlined in Section 3.2. The ensuing discussion is organized and presented on the basis of impact factors pertinent to the local community and to two impact zones within the local community, namely the Direct and Indirect Impact Zones (see Section 2.2.2 of this report).

7.3.1 FARM DISPLACEMENT - LOSS OF ON-SITE LAND BY OFF-SITE FARMS

This factor addresses the potential for loss of farm units that are headquartered off-site as a result of the loss of on-site lands. Other impacts on such farm units are addressed in the next section.

One farm operation located off-site, a dairy farm, will lose on-site lands. The property in question is virtually all Class 3 land and is not tile drained. There is one old barn but no livestock on the property. This estate property, which is owned by family members is 16% of the operation's land base and 28% of its cropland.

The property is located just 300 m (980 ft) away from the headquarter property on Vaughan Road. Access by road is therefore easily and quickly achieved for field operations.

The land base required to carry a dairy herd depends on crop yields and feed requirements. A milking cow typically requires 18 kg/day of total feed, measured as dry matter, while a dry cow requires 10 kg/day. Based on yields for silage corn, hay and small grains in the area (see Chapter 4, Section 4.3.8), these feed requirements translate to one to four acres per cow. Consequently, the on-site parcel is probably necessary to support the dairy herd of the impacted operation and will have to be replaced unless the herd is reduced in size. The impact of losing this parcel is therefore significant to this farm unit.

If we assume that the displaced property will be replaced then the severity of the impact will depend on the nature of the new parcel and on how much difficulty is encountered in locating it.

Questionnaire results related to farm planning suggest that 22% of respondents have plans to reduce their cropland area or to get out of farming while another 20 percent wish to increase cropland area. This implies that properties become available and change hands on a regular basis in the area. In 1986, 599 ha (1479 ac) or 8% of improved farm land was idle in the local community (Appendix C, Table C-3). It is therefore reasonable to expect that alternative cropland can be located to replace the on-site parcel.

7.3.2 FARM FAMILY/FARM OPERATOR DISRUPTION

This section of the report addresses the impact on farm families and farm operators resulting from nuisance effects, including noise, dust, visual intrusion and interference with farm traffic. The nature of the response of farm families and operators will govern the fate of existing farm businesses.[41] The nature of each of these effects is discussed briefly.

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[41] Access road effects are introduced here in order to more fully account for cumulative impacts on farms located in close proximity to the site. A more detailed discussion of access road impacts is provided in Section 7.4.

Direct and indirect impact zones are delineated on the basis of the cumulative nuisance effects that are expected; farm operations in these zones are described; and attitudes and concerns of affected operators are outlined.

7.3.2.1 Off-Site Nuisance Effects

Nuisance effects will result from both construction and operational activities on-site and from related off-site access road use.

Noise: Off-site noise levels related to facility activities were calculated at the face of residential structures and for each outdoor living area (S.S. Wilson and Associates, 1987). The on-site noise sources included construction activity, plant operations and landfill operations. Estimated levels, measured as dBA,[42] were compared to ambient (existing) levels and to MOE criteria.

Noises generated by landfilling operations are the main focus of the assessment due to their relative magnitude and duration over the life of the facility. The landfill noise source will move with time as the landfill is progressively filled. Most impacted farms will be affected by noise for one quarter to one-half of the site's operating life. Highest noise levels at adjacent farm households will be in the 55 to 70 dBA range [43]; these can fall by 20 dBA or more as landfilling operations move to more distant areas. The Ministry of the Environment criterion for noise from landfilling operations is 55 dBA. An increase from 150,000 t/a of total waste treated to 300,000 t/a will increase landfilling noise by about 2 dBA.

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[42] Noise data are sound pressure data measured as decibels (dBA); every 10 dBA represents a doubling of noise level.

[43] A farm tractor generates a noise level of 73 dBA at a 3 m distance.

In contrast to landfilling operations, plant operations generate off-site noise levels which are only marginally greater than the Ministry of the Environment criterion of 40 dBA for industrial plants. Off-site plant noise levels are below ambient day-time noise levels in most cases.

During construction activity, off-site noise levels from the plant site in the most active month are somewhat less than landfilling noise levels, reaching just over 60 dBA in the worst cases. However, preliminary landfill construction will generate off-site noise levels that are about 1 dBA above the landfilling noise levels during the operational phase. Other perimeter construction activity (e.g. berm construction) could result in off-site noise levels as high as 90 dBA for short periods; for instance, if four or five units of heavy equipment are working beside adjacent households. Construction noise is subject to at-source noise level standards set by the Ministry of the Evironment.

The following criteria are applied to the landfilling noise levels in order to assess impact (S.S. Wilson and Associates, 1987):

No Impact - 0 to 3 dBA increase over ambient, hardly perceptible
Low Impact - 4 to 5 dBA increase over ambient, noticeable
Moderate Impact - 6 to 10 dBA increase over ambient, almost twice as loud
High Impact - increase of 11 dBA or more, more than twice as loud.

Landfill noise impacts are also evaluated relative to the Ministry of the Environment criterion of 55 dBA for landfill operations.

Visual Intrusion: The construction phase represents a period of dynamic change in visual character as on-site features of the existing rural setting - croplands, farm buildings, woodlot, etc. - are replaced by plant facilities (buildings, stacks, etc.), roads, perimeter berms and fencing and the landfill (EDA Collaborative, 1987).

The nature of the visual impact during the operational phase was assessed using the following criteria:

High Visual Impact - full, unobstructed view of the facility (i.e. stacks, berms, buildings, plumes); facility demands attention of the observer. Covers an area within 0.0 to 0.8 km of the site.

Moderate Visual Impact - views of the site are partially screened but the facility begins to dominate the landscape and attracts attention. Covers an area between 0.8 and 2.0 km from the site.

Low Visual Impact - only parts of the facility can be seen, these contrast with the surroundings but do not attract attention. Covers an area between 2.0 and 5.0 km from the site.

Little or No Visual Impact - strong visual screening obliterates views and facility is minimally visible at best. Covers area beyond 5.0 km from the site.

Zones corresponding to these impact levels tend to be concentric about the site, though areas of lower impact at close proximity to the site are created by woodlots and other landscape features that provide screening. Delineation of these zones appears in the visual impact analysis by EDA Collaborative (1987).

Dust: On-site vehicle movements and the operation of excavation equipment will give rise to periodic off-site emissions of dust during construction and operational phases. The amount of dust will depend on weather conditions, the level of on-site activity and the use of on-site mitigation measures to control dust.

The Ontario Research Foundation (1987) has predicted that under adverse conditions nuisance effects related to off-site dust fall will occur within 100 m of the site perimeter during construction and within 460 m during landfill operations. Dust emission episodes within this zone are expected to be infrequent and of short duration.

Traffic Interference: There is a potential for disruption of farm vehicle movements by truck traffic. Within the context of the discussion in this section, the location of the farm headquarters and of croplands relative to the access route are the principal determinants of this type of interference. The following criteria were used to guide the evaluation of this effect:

High Impact - headquarter property abuts the Highway 20 section of the access route

Moderately High Impact - headquarter property is not on the access route but the Schram Road and Highway 20 sections of the access route are used to move equipment to other properties

Moderate Impact - headquarter property is not on the access road but either Schram or Silverdale Road is the main route to Highway 20

Moderately Low Impact - headquarter property abuts Highway 20 west of the access road

Low Impact - headquarter property is not on Highway 20 and there are readily accessible routes other than Schram Road to reach Highway 20 and other farmed properties.

Other Nuisance Effects: Atmospheric emissions can potentially give rise to other nuisance effects; namely off-site odours associated with contaminant emissions and fogging and icing associated with the evaporator stack plume. Analysis of these effects under worst case atmospheric conditions indicates that the evaporator stack plume should not result in significant fogging or icing and that, occasionally, odours will be detected beyond the site perimeter under the most adverse weather conditions (Ontario Research Foundation, 1987). Since the predicted impacts are so low, these effects are not considered further in this section.

Visual impact will include night-time lighting effects in addition to those visual effects noted above. The zones impacted by night lighting may differ from those experiencing low, moderate and high visual intrusion effects if screening by foliage is less effective for lights at night or if there is a significant glow in the sky. Night lighting is to be directed downwards to minimize light effects; perimeter berms will also help to limit the view of lit surfaces. Lighting effects are not addressed in detail in this report. Observations are made below on lighting based on an evaluation by the Institute of Environmental Research (1987).

7.3.2.2 Direct Impact Zone

Upon compiling and analyzing nuisance impact data, the site assessment consultants identified a direct impact zone (DIZ) within the Local Community. Nuisance impacts have a cumulative effect on properties in the DIZ; in particular, most of these properties are subject to:

- high visual impact and/or dust impacts; and,
- moderate or high noise impacts.

Certain properties which are not impacted to this level were nevertheless included in the DIZ due to their proximity to the site relative to other properties within the DIZ.[44]

There are 21 farms whose headquarters are located within the DIZ. Six other farm operations headquartered outside the DIZ have parcels of land within the DIZ.[45] An understanding of the general characteristics of both groups of farmers is essential for the assessment of impacts in this zone. The locations of these farmers and the farmed properties associated with them, are shown in Figure 7.1.

The following description of the farm operations associated with the DIZ begins with those whose headquarters are located in the DIZ, grouped by type of farm enterprise. This is followed by a description of farm operations headquartered outside the DIZ, but with parcels of land located in the DIZ:

Dairy - Five farms with dairy as their main enterprise are located within the DIZ. Four of these are headquartered on parcels immediately adjacent to or across the road from the site.

An average of 36 cows are milked on these farms. One of the operations also has hogs. These are housed in barns located outside the DIZ.

All five farms are full-time operations. Five are organized as family partnerships while one is a sole proprietorship. Three of the operators have lived more than 20 years at their current location and the other two

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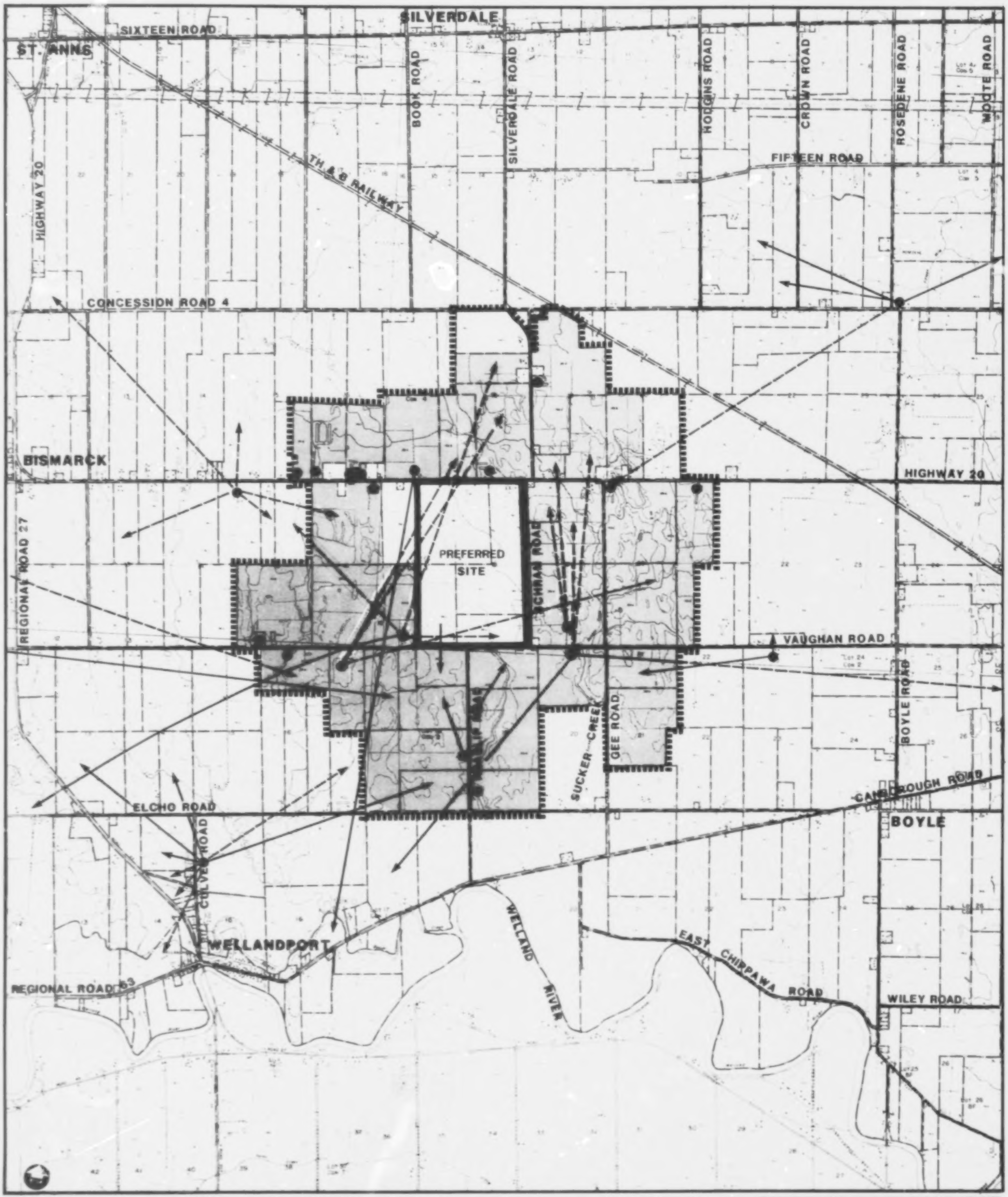
[44] For more details see OWMC, 1988.

[45] One additional farm operator headquartered on-site works a small parcel of land located in the Direct Impact Zone. Refer to Section 7.2.1 for discussion of this operation.


SILVERDALE
SIXTEEN ROAD
ST. ANNS
BOOK ROAD
SILVERDALE ROAD
HODGINS ROAD
CROWN ROAD
ROSEDENE ROAD
MOOTE ROAD
FIFTEEN ROAD
TH & B RAILWAY
HIGHWAY 20
CONCESSION ROAD 4
BISMARCK
REGIONAL ROAD 27
PREFERRED SITE
SCHRAM ROAD
VAUGHAN ROAD
BOYLE ROAD
GEE ROAD
SUCKER CREEK
CANBOROUGH ROAD
BOYLE
ELCHO ROAD
CULVER ROAD
WELLANDPORT
REGIONAL ROAD 63
WELLAND RIVER
EAST CHIPPAWA ROAD
WILEY ROAD

OWMC Ontario Waste Management Corporation

500 0 1000 1500m

Consultant:

ecologistics limited

FARM OPERATIONS IN THE NUISANCE IMPACT ZONE

Figure 7.1

Legend:

- ▪▪▪▪▪ Nuisance Impact Zone Boundary
- ● Active Farm Headquarters
- ▭ Farmed Property
- Associated Farm Properties
  - ← Owned
  - ←-- Rented
- - - - Property Ownership Boundary

Source: Ministry of Revenue Assessment Rolls (1985) and the 1986 Farm Survey.

have lived on their farms for 10-20 years. One of the farms was in the family for more than 20 years before being turned over to the present family members. The other four farms were not previously owned by family members.

All of the land on three of the farms is owned and located almost entirely within the boundaries of the DIZ. The average size of these farms is 46 ha (114 ac). The other two farms are larger operations comprising an average of 69 ha (171 ac) of owned land and 73 ha (180 ac) have lived on their farms for 10-20 years. One of the farms was in the of rented land. About two-thirds of the total land area farmed by these two operators is also located within the DIZ.

Poultry - Seven poultry farms are located within the DIZ, one of which is headquartered adjacent to the site. Four of these farm operators raise turkey broilers, one raises chicken broilers, one operation includes both chicken and turkey broilers and one operation combines poultry with a large beef feedlot. An average of 27,000 chicken broilers and 14,000 turkeys are housed on these farms.

Two of the farm operators have lived at their current locations for more than 20 years; three others for less than five years, and the other two between 6 and 19 years. None of the farms were previously owned by other family members.

These farms operate on a relatively small land base, averaging 29 ha (72 ac) of owned land. Four of the seven rent cropland out to other farmers.

Beef - In addition to the major beef feedlot-poultry operation (see above), there are two beef farms in the DIZ. Neither of the two have headquarters adjacent to the site, but one of the beef operators owns a 5 ha (12 ac) parcel of land adjacent to the site.

There is one small cow-calf operation, with 15 to 20 cows, the other farm is a small feedlot with a similar number of feeder cattle. The land base of these farms is entirely owned, averages 30 ha (74 ac) in size, and is completely contained within the DIZ.

The two farms are reported to be full-time operations.

Both of the operations are sole proprietorships. One of these has been in the family for over 100 years, whereas the other was in the family 10 years. The latter operator has lived there for approximately 15 years.

Hogs - Two hog operations, both farrow to weaner, are located within the DIZ. Both operators report cash cropping as a secondary component of their farm enterprises.

These farms are family partnerships, the one having been in the family for more than 70 years. One is a full-time operation, whereas the other is part-time.

The land base is entirely owned by these operators; the average farm size is 43 ha (106 ac).

Cash Crop - Three cash crop operators are located within the DIZ. For two of them, cash cropping is the sole farm enterprise, whereas the third raises a small number of beef cattle as well.

These farms are organized as sole proprietorships or as partnerships with a spouse. Two report full-time employment on the farm, whereas the other is a part-time operation.

Two of the operators have lived on the farm for more than 20 years; one of these farms has been in the family for over 100 years. The third farmer has lived on the farm for 6-10 years, and has had family in West Lincoln for over 100 years.

An average of 33 ha (82 ac) of owned land is farmed by these operators. One of them rents an additional 99 ha (245 ac). All of the land base, including both rented and owned properties, is located within the DIZ.

Hobby Farm - Two small hobby farms have been identified within the DIZ. One farm is based on 1.2 ha (3 ac) of owned land and an additional small rented area. The other farm is comprised of 11 ha (26 ha). Several horses and beef animals are kept on each farm. Both operators have full-time off-farm jobs.

Farm Operations Headquartered Outside the DIZ with Owned Land Within- Three farm operations fall within this category. Two of these are relatively large dairy or poultry operations managed by father-son partnerships, with cash cropping cited by one of them as a secondary activity.

Each of the three farm operators own one parcel of land within the DIZ, averaging 20 ha (49 ac) in size. The proportion of land owned by each farmer within the DIZ ranges from 15 to 30% of the owned land base, and from 10 to 20% of the entire land base which averages 132 ha (325 ac).

All three parcels are used for cash cropping purposes; no livestock are associated with these parcels.

Two of the parcels lie relatively close to the respective farm headquarters located outside the DIZ. The third operator has to travel approximately 5 kilometres to access the property from the farm headquarters.

Farm Operations Headquartered Outside the DIZ with Rented Land Within- Three farms, identified as poultry, dairy and cash crop operations, rent land within the DIZ. The total land base of these farms averages 145 ha (358 ac). The rented land in the DIZ comprises 33 to 47% of the total rented land of the operators, and 11 to 26% of their total land base.

These rented lands are used exclusively for cash cropping. One of the three farmers has to travel approximately 5 kilometres to access his parcel; the other two are closer.

7.3.2.3 Assessment of Nuisance Impacts in the Direct Impact Zone

Exposure level data for nuisance effects were determined for individual farms (Table 7.1). These data form the basis for assessing cumulative nuisance impacts and are used to determine the relative severity of the potential impacts on each farm.

The first six farms listed in Table 7.1 will experience high cumulative impact from nuisances. The following exposure levels are anticipated for these farms:

- high visual intrusion at the residence and over much of the cropland,
- high or moderate noise impacts and exceedance of Ministry of the Environment noise criteria from landfilling operations (four will experience a high noise level for half the life of the facility at a 300,000 t/a operating level),
- potential dust impacts,
- moderately-low to moderately-high traffic impacts.

Five of the six operations are established livestock operations with correspondingly high and immobile capital investments. With the

TABLE 7.1

PRE-MITIGATION IMPACT SUMMARY FOR FARM OPERATIONS WITH HEADQUARTERS IN THE DIRECT IMPACT ZONE

OPERATOR	NOISE IMPACT[1,3]		VISUAL[1] INTRUSION		DUST[2]	FARM[1] TRAFFIC
	150,000 t/a	300,000 t/a	Residence	Cropland		
H. Diek	H	H*,**	H	H	I	MH
B. Snippe	H	H*	H	H	I	MH
D. Schuender	H*	H*	H	H	I	M
S. Kszan	H**	H*,**	H	H,M	I	MH
C. Huizinga	H**	H**	H	H	I	ML
C. Tsiantoulas	M**	M***	H	H,N	I	ML
J. Reiner	M	M**	H	M,N	I	ML
C. Gracey	M	M	M	H,M	O	L
R. Allen	L	M	N	N	O	MH
A. Augustyn	L	M	H	H,M	I	M
A. Boradyn	N	N	H	H,N	O	H
G. Trifunovic	N	N	M	M,N	O	H
E. Gracey	N	L	H	H	O	L
Beliak Estate	N	N	H	M,N	O	L
D. Comfort	N	N	H	H,M	O	L
De Jong Feedlot	N	L	M	H,N	O	ML
O. Sarantakos	L	M	H	H	O	ML
D. McCarthy	L	M	H	H	I	ML
H. Otten	L	L	H	H,N	O	M
G. Vandervelde	N	L	M	M	O	H
R. Madsen	L	M	N	N,M	O	ML

[1] H = high, MH = moderately high, M = moderate, ML = moderately low, L = low, N = negligible, little or no impact

[2] I = in dust zone, O = outside dust zone

[3] Noise ratings are based on exceedances over ambient levels in the outside living area at each residence and reflect typical operations.

* = high noise impact occurs for half of facility life (one quarter otherwise)

** = MOE criteria exceeded for 1/4 of facility life

*** = MOE criteria exceeded for 1/2 of facility life

Sources: Noise - S.S. Wilson and Associates, 1987
Visual - EDA Collaborative, 1987
Dust - Ontario Research Foundation, 1987

livestock, they will be working at the headquarter property practically every day of the year and thus be subject to both enduring and temporary impacts. Also, they tend to be at ages when they would not normally be contemplating major changes in their livelihood and are less likely to be amenable to change.

Of the remaining 15 operations headquartered in the DIZ, 14 will experience moderate to high visual intrusion, seven will be subject to moderate noise levels (300,000 t/a case), six may experience moderate to high interference with farm vehicle movements, and two are in the dust impact zone. All will be subjected to a moderate to high level of exposure of at least one nuisance impact.

All farm headquarters within the DIZ are subject to night lighting effects (Institute of Environmental Research, 1988).

As noted above, there are six farm operators headquartered outside the DIZ, who farm land within the zone. Three of these own the land, and three rent the land. Although they will be exposed to varying degrees of nuisance impacts, the farmers do not reside on the affected properties, and their exposure will be largely limited to periods of field work, operations which themselves typically generate noise, dust or odours. These properties are therefore assigned a low impact rating.

7.3.2.4 Indirect Impact Zone

Of the various nuisance effects, only moderate and low visual impacts and night lighting effects are anticipated beyond the DIZ in the remainder of the local community. This outer portion of the local community is identified as the indirect impact zone (IIZ) since direct impacts will not dominate.

Virtually all farm properties in the IIZ, except for a strip of properties along its northern and eastern boundaries, are exposed to at least a low degree of visual impact.

The line delimiting the moderate visual impact zone crosses numerous farm properties; consequently, varying proportions of the properties are contained within the IIZ zone boundary. Such properties were considered to be within the zone if the farm buildings lie within the zone boundary, or, if 50 percent or more of a farm property is contained within the boundary. Nine farm operations have buildings within the moderate visual impact zone: two poultry, four dairy, one beef and two small mixed farm operations.

The poultry farms are chicken broiler operations based on small land areas (owned land averages 24 ha [60 ac]). One of the operators has lived at his current location for more than 20 years, but has no ancestry in West Lincoln.

The four dairy farms are full-time operations. One of the farms is a relatively small operation occupied by the owner two years ago. The other three dairy farm operations are larger, reporting an average of 54 cows on an average land base of 144 ha (356 ac). Much of the land base of these farms is owned. These three operators have been at their current addresses for longer than 20 years; two report ancestry in West Lincoln. The beef farm is a cow-calf operation with some off-farm income.

The two mixed farms have relatively small land bases (owned land averages 30 ha [74 ac]). Both operators have lived at their current locations for longer than 20 years, but report no ancestry in West Lincoln. Only a few head of livestock are raised on these farms.

Four farms have 50 percent or more of at least one farm property within the moderate visual impact zone. This includes two cash crop and two dairy farms. All are relatively large farm operations, averaging 138 ha (342 ac) in size. Two of the four operators have lived at their current locations for more than 20 years, and three of the four are known to have ancestry in West Lincoln. The proportion of land within the moderate visual impact zone for individual farms ranges from 12 to 35 percent.

7.3.2.5 Concerns of Farmers Related to Nuisance Impacts

The concerns of farm operators interviewed in the local community with respect to nuisance impacts are presented in Table 7.2. These data are grouped by impact zone and location of the farm headquarters.

About 70 percent or more of the respondents headquartered in the DIZ believed that facility truck traffic, noise, dust and odours would affect their household or farm operations; just under 50 percent expected effects from lights or views of the facility. In contrast to these mixed expectations regarding nuisance effects, respondents were almost unanimous in expecting air and water pollution.

A high degree of concern regarding nuisance impacts was expressed by those living within one property of the site. This corresponds fairly closely with the assessment of nuisance effects predicted by the OWMC site assessment consultants. The principal exception to this is the response of three operators who do not anticipate visual impacts; the OWMC consultant has predicted high visual intrusion on these properties.

Air and water pollution are also a major concern beyond the DIZ. Among the nuisance effects, truck traffic and odour impacts are widely anticipated beyond the DIZ.

TABLE 7.2

FARM RESPONDENT CONCERNS WITH FACILITY EFFECTS[1]

Facility Effect	Headquartered Inside DIZ[2]	Headquartered Outside DIZ with Land Inside DIZ	Headquartered Outside DIZ with No Land Inside DIZ	All Farm Respondents
	- - - % of respondents anticipating an effect - - -			
Air and Water Pollution	92	60	96	93
Truck Traffic	85	60	72	74
Odours	69	60	64	65
Dust	77	0	37	42
Noise	77	20	32	40
Seeing Facility	46	20	31	33
Lights	39	20	6	13
Number of Respondents[3]	13	5	49-50	67-68
Total Farmers in Zone	21	6	112	139
Coverage	62%	83%	44-45%	48-49%

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[1] This table indicates the percentage of farm respondents answering `yes´ to Question 85 in the Phase 4B (1986) questionnaire (see Appendix A). The question asks whether or not they thought their household or farm would be affected by the facility effects listed above.

[2] DIZ = Direct Impact Zone

[3] The number of respondents varies within certain groups since some questionnaire respondents refused to answer certain questions.

7.3.2.6 Significance of Farm Family/Farm Operator Disruption

Within the DIZ and particularly for properties experiencing high levels of cumulative effects, the nuisance effects are considered to be a significant adverse outcome of the proposed development. This evaluation reflects the magnitude, long duration and certainty of nuisance effects on relevant farm properties.

Less significance is assigned to nuisance effects outside of the DIZ because of the lower exposure levels predicted for this area. This conclusion is cosistent with the lower level of concern expressed by farm operators in this outer zone.

7.3.3 FARM PRODUCTIVITY IMPACTS

This section assesses the risk of adverse effects on crop and livestock production from contaminants and nuisance impacts. Findings of the consulting team regarding risk are reviewed and the attitudes and perceptions of farmers are summarized.

7.3.3.1 Exposure to Nuisance Impacts

Nuisance impacts that could conceivably affect crop and livestock productivity relate to dust and noise. Forecast dust levels are expected to be of short duration and are limited to 10 farm properties. Noise impacts will be more extensive with several adjacent properties experiencing a significant impact (see Section 7.3.2).

While these nuisance impacts are expected to affect farm operators and their families, there is no evidence to suggest that crop or livestock production will be harmed directly.

After decommissioning, nuisance effects such as noise will cease, but the potential exists for a new type of nuisance to arise that is specific to crop production; the decommissioned site could become a source of weed infestation for adjacent cropland if land management practices on-site do not control weed growth. Weed infestation has a direct impact on crop production costs and crop yields.

7.3.3.2 Downstream Agricultural Activity

Downstream agricultural concerns relate to agricultural activities along creeks that receive runoff from site lands.

The site is situated at the head waters of Beaver, Sucker and 9C Creeks which flow south to the Welland River. Since discharges of storm water runoff from the site to the Welland River will be routed through a buried storm sewer along Heaslip Road, the intermittent flows in these creeks may be lower or of shorter duration (Gartner Lee, 1987b). There are four pasture areas on the creeks and farmers on 9C Creek report that their pastured livestock are watered in this creek on a seasonal basis. With the diversion of on-site flows, these farmers will not be able to rely to the same extent on this creek as an alternative water supply.

7.3.3.3 Atmospheric Emissions

This section considers the implications to agriculture of atmospheric emissions originating from on-site sources.

Hazards associated with exposure of crops and livestock to contaminants in atmospheric emissions were evaluated by Environ (1988). In their analysis, they considered three routine sources:

- incinerator emissions,
- evaporator emissions,
- fugitive emissions,

and five sources associated with upset conditions:

- failure of scrubbers for incinerator emissions,
- tank farm fire,
- mixing of incompatible wastes,
- pH excursions in treatment of cyanide wastes,
- pH excursions in sulfide treatment of inorganic wastes.

A modelling approach was used to predict crop and livestock exposure levels at locations about the site at which maximum exposures would be expected. Exposure levels are expressed in terms of organism doses and in terms of resulting concentrations of contaminants in plant and animal tissues.

Contaminant doses are compared to dose levels at and below which there are no observable effects associated with the contaminant; these are called criterion doses. The potential for injury to crops or livestock is based on this comparison. In addition, where there are applicable standards related to food product contamination, predicted tissue concentrations are compared to these standards. In particular, food product standards that are considered here are outlined in Table 7.3.

Results of the modelling analysis are used here as a general indication of the potential for injury to crops and livestock. Considering the uncertainties associated with prediction of chemical exposure, these results are interpreted primarily as order-of-magnitude estimates. Moreover, safety factors are built into the criterion dose levels to help account for methodological and data limitations.

For the routine emissions (incinerator, evaporator and fugitive) none of the criterion dose levels for livestock or crops were exceeded by predicted exposure levels, and in the majority of cases, the criterion dose levels were several orders of magnitude higher than predicted

TABLE 7.3

FOOD PRODUCT STANDARDS

Contaminant	Standard	Food Product
Arsenic	0.5 mg/kg	pork and poultry, eggs
Copper	50 mg/kg	fresh fruit and vegetables
Hexachlorobenzene	0.5 mg/kg	milk, milk products
	1.0 mg/kg	meat
	0.1 mg/kg	all other food products
Lead	0.15 mg/kg	evaporated milk, concentrated infant formula
	0.2 - 0.5 mg/kg	fruit juices, beverages
PCB´s	0.2 mg/kg	butterfat in dairy products, fat in all meat except poultry
	0.5 mg/kg	fat in poultry
Dioxine	20×10^{-5} mg/kg	fish

Source: Ecologistics Limited, Livestock Literature Review, 1988.
Meat Hygiene Division, Agriculture Canada, 1986

exposure levels. Cases in which exposure levels were within an order of magnitude of the criterion dose are as follows (Environ, 1988, Appendix L):

dairy cows - lead from incinerator emissions
- toluene and formaldehyde from fugitive emissions

steers - zinc from incinerator emissions

duck - mercury from incinerator emissions

quail - zinc from incinerator emissions

For plant exposure levels, only zinc from incinerator emissions and formaldehyde from fugitive emissions were within an order of magnitude of the criterion dose. For these chemicals exposure levels are very unlikely to create adverse effects.

Exposure levels resulting from the upset conditions that were evaluated were in most cases several orders of magnitude below criterion dose levels. However, the incinerator scrubber failure was estimated to produce hydrogen fluoride and hydrogen chloride exposure levels within an order of magnitude of criterion dose levels for plants while the tank farm fire was estimated to produce methylene chloride exposure levels that were slightly higher than the criterion dose level for the dairy cow. This latter dose could be associated with short-term reversible effects in the dairy cow.

Predicted tissue concentration levels were available for incinerator, evaporator and fugitive emissions. None of these data suggested that contaminant standards for food products would be violated, since predicted concentrations were, for the most part, several orders of magnitude below standards.

There are however many contaminants of industrial origin for which there are no standards and for which there is no routine program of food testing. OWMC recognizes that, at such time as new or revised standards appear, it will be required to operate its facility within these standards and is committed to making any necessary adjustments in the treatment process to achieve these.

Concerns expressed by farmers about the risks associated with the facility are summarized in Table 7.4 It is evident that there is almost unanimous agreement among farm operators that there are risks to health, risks of transportation accidents, and risk of water, crop and livestock contamination. Similarly, most farm respondents did not express confidence in the waste treatment technology, the reliability of the operators, or monitoring.

Operators headquartered outside of the direct impact zone expressed somewhat less concern about facility risk than those located closer to the site, but levels of concern were nevertheless high.

The high level of concern that prevails is not supported by modelling results from Environ (1988) which suggest that adverse effects are not likely to be experienced by crops or livestock due to atmospheric emissions. No hazards are associated with routine operations, though for certain chemicals, exposure levels are within an order of magnitude of criterion doses. For upset conditions, the criterion dose was exceeded by a small margin in only one case involving dairy cows. The evaluation based on modelling analysis is however limited by a number of methodological and information constraints. Given the uncertainties in the technical analysis and the apparent level of concern among farm

TABLE 7.4

FARM RESPONDENT ATTITUDES TOWARDS RISK[1]

Risk Statement	Group 1 Hdqr´d Within DIZ[2] (%)	Group 2 Hdqr´d Outside DIZ with Land Inside DIZ (%)	Group 3 Hdqr´d Outside DIZ with No Land Inside DIZ (%)	Group 4 All Farm Respondents (%)
There is a risk to health	92	60	87	86
There is a risk of transport accident involving a spill	100	100	93	94
There is potential for water contamination	92	100	89	90
There is risk of crop/livestock/ contamination	92	80	82	83
Technology will dispose of waste	8	20	21	18
Operators can be relied on	8	40	13	14
Monitoring by community will relieve concerns	8	20	23	20
People will buy crops	8	40	12	13
Number of Respondents[3]	13	5	52-54	70-72
Total Farmers in Zone	21	6	112	139
Coverage	62%	83%	46-48%	50-52%

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[1] This table indicates the percentage of farm respondents `agreeing´ or `strongly agreeing´ to Question 84 in the Phase 4B (1986) questionnaire. This question asks how much they agreed or disagreed with the risk statements listed above.

[2] DIZ = Direct Impact Zone

[3] The number of respondents varies within certain groups since some questionnaire respondents refused to answer certain questions.

respondents, the perception of risk associated with atmospheric emissions must be viewed as a potentially significant impact. (Perceptions are a key element in this assessment of significance.)

7.3.4 FARM BUSINESS IMPACTS

In addition to potential impacts on farm productivity discussed above, farm operations could experience changes in overall economic performance as a result of various indirect facility effects. The potential for such effects is assessed in this section.

7.3.4.1 Decrease in Property Value

The proposed facility may depress property values in the Direct Impact Zone by up to five percent, primarily because of nuisance effects. Property values are expected to return to normal within five years (Morehouse Economic Planning Consultants, 1987).

The prospect of declining property value is worrisome for farm operators since this represents a direct erosion of their farm equity. A loss of equity value can impair the credit worthiness of a farm operation if it results in an inadequate coverage of outstanding debt. Where outstanding debt is not a problem, loss of equity can still reduce the farm operator's access to new credit. Finally, a lower selling price could make it difficult for an operator to relocate since he may not have sufficient funds from the farm sale to buy a replacement farm.

Respondents to the Phase 4B farm survey were almost unanimous in expecting property values to fall.

While this impact is expected to be of relatively short duration, it is considered significant since it implies a potential financial burden for farmers which can limit their near-term farm development plans.

7.3.4.2 Loss of Product Sales

As previously noted in Section 7.3.3.3 most of the farmers interviewed in the local community have concerns about the contamination potential of water sources, crops and livestock. Consistent with these concerns is the respondents´ belief that `people will not buy crops grown around the site.´

Potential impacts on product sales will be dependent on a number of interrelated factors:

- proximity to the site of commodity production;
- type of product sold (e.g. consumed directly or, as a processed product);
- method of sale (e.g. at the farm gate or, through regional or provincial markets);
- communication by the media and others of information suggesting reasons for consumer concern.

The likelihood of consumer reluctance to buy produce from farmers operating near the site will depend largely on how readily the product in question can be linked in the consumer´s mind with the facility. Therefore, it is expected that products sold directly to the consumer at the farm gate would be affected the most. Evidence of this type of consumer resistance was found in the investigation of comparable facilities (see Section 6.3.5). The least affected would be products sold through regional or provincial markets and/or requiring considerable processing before consumer consumption (e.g. grains).

Results of the Phase 4B surveys indicate that relatively few directly consumable farm products within the DIZ are sold at the farm gate. One farmer near the site sells eggs and small quantities of fresh garden produce. One other farmer who works land near the site also sells eggs.

The bulk of the income generated on these two farms is generated by sales of eggs to the Egg Marketing Board; therefore, potential loss of income in relative terms through impacts to farm gate sales would be minimal.

Within the local community, several farmers reported sales of livestock and poultry to local buyers. Five farmers reported selling small numbers of poultry, meat goats, and geese to unspecified local buyers. These sales are not likely to generate significant income. Four farmers reported selling larger numbers of beef cattle or hogs to local buyers, but the numbers sold would indicate that distribution of meat products would be spread over a regional market. Two farmers reported selling quail or pheasants to supermarkets or restaurants located outside the Niagara Region.

Overall, the potential loss of sales of meat products due to an adverse consumer response should be minimal in light of the high proportion sold in regional or provincial markets. There was, however, some indication in a meeting with local producers that product buyers for retail outlets may be sensitive to the facility siting and could cut purchases in order to preempt any negative consumer reaction.

Crops purchased from the local community would most likely be fed to livestock and therefore not consumed by humans. Of the 24,034 bu of barley reported sold by farmers within the local community, 27 percent (6510 bu) was purchased by local farmers. The remainder was sold to regional elevators and feed mills. Nineteen percent of the hay reported sold (1519 tons) was purchased locally, and the remainder (6300 tons) was purchased and distributed to other parts of Southern Ontario. All other field crops that were sold were purchased by regional purchasing centres.

Farmers within the local community, if they plan to continue farming in the area, are likely to continue purchasing locally grown animal feedstuffs. The feed mills and elevators in the area purchase grains from a variety of sources and are likely to blend crops from this area with grain purchased from other areas. Farmers from outside the local community who purchase field crops at the farm gate and who perceive themselves to be outside the zone of the facility's influence, might be more hesitant to continue purchasing within the local community. However, these farmers purchase a relatively small proportion of total field crops sold, and therefore impacts on total sales should be minimal.

Little documentation of consumer response to real or perceived environmental contamination of food products is available in the research literature. It is clear, however, that "chemicals" in food and the health and safety issues associated with them are a high priority concern for the consumer. There are also indications that food grown near sources of environmental contamination is perceived by consumers to be contaminated and therefore dangerous. However, it is not clear whether these perceptions result in foodstuffs being rejected by the consumer, and if so, for how long. In addition, the zone within which such food could be potentially rejected is not well defined.

Loss of product sales could potentially be a significant impact for certain farmers. This potential for impact, particularly on livestock product sales, exists if publicity creates a widespread public "scare" or if buyers for retail outlets decide to terminate local purchases in anticipation of buyer resistance to the product.

7.3.4.3 Local Services

Site services will utilize existing corridors and will not displace existing farm activities. Therefore, significant impacts are not anticipated from site servicing arrangements.

7.3.5 AGRICULTURAL COMMUNITY IMPACTS

Agricultural community impacts include changes in community structure and function that arise as an indirect consequence of changes associated with the proposed facility. In focussing on agriculture, many dimensions of the larger community are overlooked, for instance the schools and churches. These are considered as part of the social impact assessment undertaken by the Institute of Environmental Research (1988). A number of indicators are considered below.

7.3.5.1 Out-Migration of Farm Operators

This section addresses the potential consequences of out-migration of farm operators and their families as a result of displacement or in response to nuisance effects, concern about risk or other adverse impacts of the proposed facility or simply uncertainty about the quality of their lives and the viability of their businesses. Unlike the displacement impacts and certain nuisance impacts, voluntary out-migration can not be forecast with any degree of certainty.

Twenty-four farm operators in the local community indicated that they would leave if the facility is built (Phase 4B farm survey), while other operators indicated uncertainty about leaving. Of those who did not respond to the Phase 4B farm survey, some may feel like those who stated an intention to leave if the facility is built.

It is evident that the actual amount of out-migration that is eventually realized could deviate considerably from the number of phase 4B questionnaire respondents who expressed intentions to leave. Responses in the Phase 4B farm survey were made largely in the absence of any direct experience with the kind of environmental changesthat the proposed facility could cause, while stated concerns and attitudes (see Section 7.3.3) convey considerable anxiety and distrust about the facility. Given this, the expressed plans to move in response to anticipated adverse impacts and risks may not be followed if actual changes are not as adverse as expected.

In light of the uncertainty inherent in forecasting out-migration, three alternate scenarios were developed and the potential consequences of each were assessed. The scenarios are as follows:

- Scenario 1 - out-migration of farm operators subject to high levels of cumulative impacts (see Section 7.3.2.3) plus on-site farmers.
- Scenario 2 - out-migration of Scenario 1 farms, plus others in the direct impact zone who said they would move, and a portion of the farmers in this zone who weren't sure about leaving or who didn't respond to the questionnaire.
- Scenario 3 - out-migration of Scenario 1 farms plus others in the local community who said they would leave and a portion of farmers in this zone who weren't sure about leaving or who didn't respond to the questionnaire.

For purposes of extrapolation in Scenarios 2 and 3, 56 percent of non-respondents and respondents who are uncertain about leaving are assumed to leave. This value represents the proportion of questionnaire respondents who indicated that they would be leaving from among those respondents saying either that they would or that they would not leave. By using the 56 percent figure, it is assumed that all farmers will eventually act like those who have expressed clear intentions regarding their future actions.

Several key measures of the potential consequences of change associated with the different out-migration scenarios have been compiled in Table 7.5. In these, the number of farm operators that would potentially move ranges from eight to 82 or, 6 to 43 percent of all farms in the local community. The associated loss of gross annual farm income of between $1.2 and $8.7 million would represent 7 to 49 percent of the total gross farm income generated in the local community. The loss of farm jobs would range from about 8 to 46 percent for full-time jobs and 7 to 45 percent for part-time jobs in the local community.

If the characteristics of all farmers preferring to leave were similar to the 24 farmers who stated that they would move then, as noted in Table 7.6, the departing operators generally would be somewhat less involved in commercial farming and have weaker ancestral ties to the community.

Within the group of 24, eight operators run larger commercial farms averaging 121 ha (299 ac) in size. They generate an estimated $89,000 to $499,000 in gross income per farm. All of these operators expressed an interest in the continuation and growth of their farming enterprises. Only one of the eight has a part-time job off-farm. Four of the eight indicated that they would relocate within the Niagara Peninsula area, with three of these preferring a local destination (within West Lincoln).

The remaining 16 operations, with an average size of 29 ha (69 ac), have estimated gross revenues ranging from zero to $40,000. Four of these have plans to expand their operations while seven had cut back their operation or were intending to do so and four expressed intentions to sell their farms. Eight of the operators in this group have full-time off-farm jobs. Only one of the operators expressed an interest in relocating in the Peninsula (in St. Catharines), while ten did not specify destination.

TABLE 7.5

DESCRIPTION OF FARMS THAT MAY MOVE IN OUT-MIGRATION SCENARIOS

INDICATOR	SCENARIO ONE	SCENARIO TWO	SCENARIO THREE
Area Experiencing Out Migration	Site and Adjacent Properties	Site and DIZ	Site and Local Community
Number of Operations	8	15	82
Total Area of Vacated Farms (ha)	524	810	4963
Average Farm Size (ha)	66	54	61
Total Gross Farm Income ($1,000's)	1,185	3,700	8,724
Farm Employment			
full-time jobs	16	24	95
part-time jobs	18	29	120

Source: Based on analysis using Phase 4B (1986) farm survey data.

TABLE 7.6

CHARACTERISTICS OF FARMERS INDICATING THEY WOULD LEAVE IF THE OWMC FACILITY IS BUILT

CHARACTERISTICS	FARM RESPONDENTS LEAVING THE AREA[1]	ALL FARM RESPONDENTS
	- - - Percent of Respondents - - -	
Family Ancestry in West Lincoln	8*	30
Lived at Current Address		
- 10 years or less	42	38
- 20 years or more	42	44
Active Member of Community Groups	50	54
Part-time/Hobby Farmers	50*	33
Operating 28 ha (69 ac) or Less	58*	38
Number Responding	24	61-75

[1] Data were compared to "all respondent" data using the binomial test. Significant differences, noted by asterisks were tested using a 95% confidence interval.

From the point of view of a decline in productive capacity and a loss of the commercial agricultural resource base in the local community, Scenario 3 would constitute a very significant adverse impact. However, this scenario is based on a tenuous extrapolation of questionnaire data and reflects only the opinion of respondents who had no direct experience with the type of impacts likely to be experienced in the local community. Scenarios 1 and 2, in using both questionnaire data and information on predictions of direct impacts, are considered to be more reliable forecasts. These are both considerably less adverse than Scenario 3, but are still considered significant, particularly since they involve a number of established livestock operations which make a significant contribution to total farm income in the local community (see Section 4.3.10).

The impact of out-migration would be less if the large commercial operators in this group were to chose a destination that is relatively near the local community; this is the preference of a number of Phase 4B questionnaire respondents. It would be further diminished if farm operators did not move before locating a buyer for their operation. This would be expected in the absence of mechanisms such as guaranteed purchase by a third party. New farm operators would then occupy at least some of the properties that become available. Alternatively, properties might be absorbed into other local farm operations.

7.3.5.2 Non-Farm In-Migration

Non-farm families moving into the local community as a result of the OWMC facility might acquire farms in the vicinity of the proposed site for non-farm purposes. Though a meaningful prediction of the amount of in-migration cannot be made, it is forecast that 114 of the 291 jobs generated by the facility will be held by individuals who will reside in West Lincoln Township (Morehouse Economic Planning Consultants, 1987). Workers relocating to the township will seek housing. If the cost of houses in neighbouring urban centres such as St. Catharines and Niagara Falls are similar in price to the cost of farms in the local community, this could make the purchase of farms for residential purposes attractive to these new employees. Given existing severence policies, individuals choosing a rural residence would tend to buy farms, effectively taking the direct control of farm land out of the hands of farmers.

Existing rural land ownership patterns are indicative of non-farm intrusion in the local community. An analysis of 1986 land ownership and lot size information in the Ministry of Revenue Assessment Rolls, together with 1986 land use maps revealed the following:

- 35 percent of the parcels larger than 10 ha (25 ac) are owned by non-farmers (106 of 306 properties). This is 30 percent of the total acreage;

- of the 106 parcels owned by non-farmers, 62 are rented to farmers, 20 are idle farmland and 24 are not available for farming (recreational, commercial, religious uses, etc.).

Thus a majority of such properties are available to farmers but a significant number are not, and future non-farm in-migration could further erode the agricultural land base.

It is not clear at this time whether farmland is idle in the local community because of low crop prices or because parcels owned by non-farmers are not available for rental.

There is mixed opinion about the impact of non-farm intrusion on the agricultural community. Some of the potential effects are:

- a reduction in total farmed land (owned or rented),

- an increase in the supply of land on the land rental market,
- increased land prices particularly for smaller parcels (this effect could help to counteract any depression of land value caused by the facility),
- conversion of full-time farms to hobby or part-time farms,
- disputes between farmers and non-farmers over farm practices like manure management and drainage,
- a change in the structure of the community if non-farmers do not have as much social and economic interaction with locals.

While the nature and extent of non-farm in-migration cannot be accurately forecast, the consequences of in-migration for commercial agriculture will likely be adverse on balance given the potential for erosion of the land base and for farm/non-farm conflicts. However, respondents to the Phase 4B farm survey were generally optimistic about an influx of OWMC employees to the local community, 59% anticipated that this influx would be beneficial while only 11% anticipated a detrimental impact.

The potential impact is not considered to be significant at this time. Though it would be an enduring change with adverse dimensions, there may also be beneficial effects that are acknowledged by the existing farm population.

7.3.5.3 Erosion of Community Networks

This section examines the potential impacts on formal and informal community networks that could arise due to the out-migration of farm operations. Community networks are the mutually supportive ways in which individuals are linked to each other, in this case, within a specified geographical area. Reasons for the development of these links can vary, but they result from interpersonal contact through formal associations (organizations, clubs, etc.) as well as informal associations (contact with friends, neighbours, relatives, etc.).

Fifty-four percent of all farm respondents in the 4B survey stated that they were actively involved in community groups or associations. These groups can be broadly categorized as religious, agricultural, social, sports, service, school, cultural, environmental or political. In terms of more informal links, 59 percent of all farm respondents stated that they had relatives in West Lincoln and 57 percent had two or three of their closest friends living in West Lincoln.

The impacts to these linkages will depend on the extent to which out-migration from the local community occurs. The numbers of general and executive members lost to the different organizations was estimated for the out-migration scenarios defined in Section 7.3.5.1 (see Table 7.7). These estimates are based only on Phase 4B farm survey responses and do not include any extrapolation to non-respondent farm operators.

The estimates in Table 7.7 suggest that potential impacts of farm out-migration on agricultural organizations is similar in magnitude to impacts on sports and social organizations and lower than potential impacts on churches.

The impact of out-migration on non-agricultural groups is covered in greater depth for both the farm and non-farm population in the Phase 4B social impact assessment report (Institute of Environmental Research, 1988). The impact on farm organizations however is of particular interest here in that these often fulfill significant economic, educational or lobbying roles in support of the agricultural community.

Associations identified as being potentially affected by out-migration in Scenario 3 are as follows:

TABLE 7.7

NUMBERS OF FARM MEMBERS LOST TO ORGANIZATIONS, FOR EACH OUT-MIGRATION SCENARIO[1]

TYPE OF ORGANIZATION	SCENARIO 1	SCENARIO 2	SCENARIO 3
Agricultural - member	-	1	13
- exec.[2]	-	1	5
Sports - member	-	-	15
- exec.	-	-	4
Social - member	-	3	11
- exec.	-	2	4
Service - member	-	1	5
- exec.	-	1	4
Church - member	3	4	20
- exec.	1	1	8
Cultural - member	-	1	3
- exec.	-	-	-
Political - member	-	1	1
- exec.	-	1	1

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[1] Data show memberships of questionnaire respondents in zones for each scenario as follows:
Scenario 1 - respondents on high cumulative impact properties and on-site
Scenario 2 - Scenario 1 respondents plus other respondents indicating that they would move or were uncertain about moving in the DIZ
Scenario 3 - Scenario 1 respondents plus other respondents indicating that they would move or were uncertain about moving in the local community.

[2] those holding executive positions have also been included in member totals

Data Source: Based on analysis using Phase 4B (1986) farm survey data.

- 4-H Club,
- Ontario Federation of Agriculture,
- United Cooperatives of Ontario,
- Ontario Egg Producers,
- North Niagara Soil and Crop Improvement Association,
- Niagara North Cattlemen's Association,
- Wellandport Farmers purchasing group,
- North Niagara Holstein Breeder's Club,
- Ontario Trappers Association,
- Women's Institute.

Of these, the Ontario Federation of Agriculture stands to lose up to three current general members, and the Women's Institute and the Cattlemen's Association could each lose two executive members; other organizations could lose one member each.

Some appreciation of the impact of out-migration on informal networks can be obtained from Phase 4B survey information on the exchange of farm help among neighbouring farmers. Fifty-three percent of all respondents reported helping neighbours monthly or weekly and five percent reported helping others every day while only 12 percent reported never helping their neighbours. The tendency to help neighbours with farm work reported by farmers who planned to move or who were uncertain about moving was slightly higher (56 percent helping monthly or weekly, 10 percent never helping).

The extent to which impacts to community networks will occur depends in part, on the destination of those who move. Farmers who relocate within West Lincoln Township for example may choose to maintain their links in the local community. There is evidence that this could happen to some extent - 34 percent of respondents stated they would move to destinations in Southern Ontario or outside of Ontario; 21 percent said they would stay in the Region (West Lincoln, Wainfleet, Lincoln or St. Catharines); and the remainder (46 percent) did not specify a location.

There is some evidence of concern among area farmers about the prospect of out-migration. Eighty percent of Phase 4B farm survey respondents expect out-migration to occur and 43% of this group expect this out-migration to be "very detrimental" to the local community. Their worst fears would be realized if Scenario 3 predictions were realized. However, Scenarios 1 and 2, which are considered to be more realistic would have little impact on formal farm organizations though they could be expected to disrupt informal links among farmers. The impact of this disruption may diminish over time if new farm operations are established on vacated lands and new relationships among neighbouring farmers evolve. Therefore, the impact on community networks should be minimal.

7.3.5.4 Off-Farm Employment with OWMC

Forecast employment patterns are provided in Table 7.8. The jobs that may be taken up by farm family members could affect local agricultural activity in both positive and negative ways. For example:

- employment opportunities for farm operators or their spouses may enable farm families to continue their operations (perhaps on a part-time basis) in situations where economic conditions preclude full-time farming,

- local employment opportunities for farm family dependents may enable them to remain in the area and to continue to assist with farm work,

- hired help may be more difficult to obtain if OWMC wage rates are high relative to prevailing rates,

TABLE 7.8

OWMC EMPLOYMENT PATTERNS

	TOTAL EMPLOYMENT	HIRING IN WEST LINCOLN
Construction	360	not applicable
Operations:		
a) 150,000 t/a		
- directly hired	151	63
- other spin-off employment	142	53
b) 300,000 t/a		
- directly hired	221	91
- other spin-off employment	177	67

Source: Morehouse Economic Planning Consultants, 1987.

- certain farms may change in character from commercial to hobby status if operators take up full-time off-farm work. Alternatively operators may quit farming altogether and rent out their land.

Based on information about future plans reported in the 4B questionnaire survey, there is evidence that a portion of area farmers wish to scale down or close their operations regardless of the OWMC facility. Out of 83 operators responding, 14 (17%) indicated a wish to get out of farming, while four wanted to cut back on cropland area. Local job opportunities might facilitate these plans for farmers who are not retiring.

More generally, farm respondents to the 4B questionnaire tended to view OWMC-related jobs favourably. Nineteen of 28 respondents who thought new jobs would become available felt that this was a beneficial impact.

Impacts on the supply of hired labour for farm work are not expected to be significant since relatively little use is made of hired help; hired workers occupy one percent of full-time jobs and 15 percent of part-time jobs (Appendix D).

There is insufficient information to clearly determine the magnitude and significance of this impact for the farm community. While it appears to be viewed favourably, and may be of considerable benefit to some farm families, it is not likely to have a significant impact on the agricultural community at large.

7.3.5.5 Change in Local Agricultural Character

The character of agriculture in the local community could change as a result of a number of impacts including:

- out-migration of existing operators
- in-migration of new farm operators, expansion of existing operations or increase in local land rentals by remote operators
- migration of non-farm residents into the rural areas
- accelerated departure of farm-operators who are near retirement
- increased off-farm work for local farmers
- limited pressure for spin-off industrial and commercial developments (Morehouse Economic Planning Consultants, 1987)
- real or perceived danger of crop and livestock contamination.

In Chapter 5, the baseline forecast of a future scenario for agriculture suggested a continuation of the status quo with some limited influx of non-farm people into the rural area. Several of the impacts noted above could, in combination, make it less feasible or less desirable to continue intensive livestock operations. Certainly the expected risk of contamination of, for instance, milk products is a concern among farmers (Section 7.3.3.3). Complaints from non-farm residents about manure odours and time constraints for the farmer if off-farm work is taken would both work against livestock operations. Finally, a number of livestock and poultry operations within the nuisance impact zone may cease if the owners choose to leave as a result of high levels of cumulative impacts.

A shift away from dairy and beef operations would likely result in a change in cropping patterns as the need for hay and pasture falls. More land would either be idled or be devoted to cash cropping. Given the poor drainage of area soils, an increased reliance on cash cropping would likely generate more interest in improved municipal drainage and more tile drainage. Even with improved drainage, area soils are not well suited to continuous cash cropping, a factor which may lead to more idle land.

A shift away from livestock based operations would significantly affect the local farm economy since livestock operations currently account for about 80% of farm employment and gross farm income (see Appendix D).

The likelihood of changes suggested above is not at all clear. If they did occur, they would have a significantly adverse impact on the local farm community, particularly if changes led to reduced investment in farm structures for livestock rearing or a degradation of area soils caused by intensification of cropping systems.

7.3.6 AGRIBUSINESS IMPACTS

Agribusiness is a sector of the regional economy that may be more heavily impacted by farm operator out-migration than other sectors.

Respondents to the Phase 4B questionnaire identified 128 suppliers of equipment, materials, supplies and services. Of these, 89 are within the Regional Municipality of Niagara. Based on responses to Phase 4B questionnaires, about one-fifth of these suppliers could lose customers under Scenario 1 or 2 levels of out-migration; at least two thirds would lose customers under Scenario 3 (see Table 7.9).

Under these scenarios, the estimated gross annual farm revenue from crop and livestock sales associated with farm operations that would shut down ranges from $1.2 to $8.7 million (see Table 7.5). A significant proportion of this gross income is funnelled into the local and regional economy for the purchase of machinery, equipment and supplies. Province wide statistics for 1985 indicate that 49% of total gross farm sales revenues were consumed by operating expenses.[46] Assuming that the farm

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[46] 80.M.A.F., "1985 Agricultural Statistics for Ontario" (August, 1986). Ontario farm cash receipts for the year were $5,180 million and operating costs were $3,611 million.

TABLE 7.9

IMPACT OF OUT-MIGRATION ON AGRIBUSINESS

	Out-Migration Scenario		
	1	2	3
No. of Farmers Leaving	8	15	82
No. of Agribusiness Establishments Losing Farm Customers[1]:			
- Total	27	37	113
- in Niagara Region	22	29	81
- in West Lincoln	17	18	47
Annual Purchases of Inputs by Farmers Leaving[2] ($1,000´s)	580	1,812	4,275
Annual Purchases of Inputs by Replacement Operations ($1,000´s)[3]	141	219	1,340
Net Loss of Annual Purchases ($1,000´s)	439	1,593	2,935

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[1] Data are based only on Phase 4B (1986) questionnaire responses and do not account for refusals.

[2] Based on 49% of gross farm revenue in Table 7.4.

[3] Assumes all vacated land is used for cash cropping and current livestock revenue is lost - a worst case outcome.

operations in question are similar to other farms across the province, this would imply that purchases by current operations could fall by $0.6 to $4.2 million (see Table 7.9).

Actual losses would however be less since departing farmers are unlikely to move before finding a buyer for their property. This source of delay would slow down the out-migration process and, to the extent that buyers return properties to an agricultural use, there would be only a temporary disruption of purchases from agribusiness. For a worst case analysis, it was assumed that no livestock activity would move in and that vacated lands would be used subsequently for cash crops. Cash crop revenues were estimated using data from the farm survey, and estimated purchases of inputs based on these revenues are listed in Table 7.9. In this worst case, a net loss of agribusiness sales of $0.4 to $2.9 million would occur.

Any losses would be unevenly distributed. Most affected would be those suppliers who are more frequently used and who account for the largest share of farm inputs. Based on province-wide 1985 statistics[47], the share of farm operating costs allocated to various types of inputs are estimated as follows:

commercial feed - 18% of operating costs
machinery (fuel, repairs, etc.) - 13% of operating costs
fertilizer and lime - 8% of operating costs
feeder cattle - 6% of operating costs
seed - 4% of operating costs
pesticides - 3% of operating costs
building repairs - 2% of operating costs
veterinary services - 2% of operating costs
custom work - 1% of operating costs

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[47] O.M.A.F., "1985 Agricultural Statistics for Ontario" (August, 1986).

Cost shares for other supplies such as fencing, twine and insurance are small (<1%).

Eleven businesses are patronized by over 20% of respondents. On average, these firms would lose eight customers each if the 24 farm operators who in the Phase 4B farm survey indicated that they would leave the area did indeed leave the area.

The larger enterprises identified above could experience the largest absolute losses of sales revenues given the range of products that they supply. By the same token, their size suggest that they also serve a larger clientele and that therefore losses may not be as significant relative to total sales revenue of each farm. Generally, no significant adverse impact has been forecast for businesses in West Lincoln or Niagara Region (Morehouse Economic Planning Consultants, 1987).

Unlike these larger suppliers, there are 14 local trucking or custom operators who have a small number of customers among the group of farm operators who indicated that they would leave. This potential loss of customers, though amounting to only one or two per contractor, may be significant to such contractors if their business is sufficiently small and local.

The loss to agribusiness will likely be a transitory impact, largely attenuated by the entry of new farm operators. Moreover, of the farm operators indicating that they would move, 21 percent identified a preferred destination within the Region. These operators would not necessarily cease to use their current suppliers after moving. For these reasons, the impact on agribusiness is not expected to be significant.

7.4 ACCESS ROADS

This section deals with the effects of the OWMC traffic on the farm operations which abut the access route to the preferred site. Three factors were considered in the analysis:

- loss of farm land,
- farm family/farm operator disruption, and
- farm productivity impacts.

Impacts have been considered over the entire length of the access route which extends 16 km south from the QEW on Regional Road 24, then west 5 km on Highway 20 to Schram Road where the site entrance is located.

7.4.1 LOSS OF FARM LAND

The only section of the access route where land will be taken for road improvements is at the intersection of Schram Road and Silverdale Road with Highway 20, just east of the proposed site. Two options are being considered for eliminating the jog at Highway 20.

One option is to realign Silverdale Road (to the west) at Highway 20 with Schram Road. The realignment would result in the removal of .98 ha (2.4 acres) of farm land on the Tsiantoulas property. Other farmed properties would lose small amounts of land abutting the existing rights-of-way at Highway 20 and Schram Road. This includes .16 ha (.39 acres) on the K & G Beamer property and .03 ha (.07 acres) on the C. Beamer property. The land on these properties is rented to area farmers. All of the farmed land involved in this option has a CLI Class 3 rating and was either fallow or in hay crops in 1986.

The second option is to realign Schram Road (to the east) at Highway 20 with Silverdale Road. This realignment would involve the removal of .98 ha (2.4 acres) of farmed land from the K & G Beamer property, and small amounts from the C. Beamer (.05 ha/.12 acre) and Tsiantoulas (.04 ha/.10 acre) properties at Highway 20.

The amount of farm land to be taken for either option will not have a significant effect on the subject farms. Relatively small areas of rented land are involved.

7.4.2 FARM FAMILY/FARM OPERATOR DISRUPTION

The impacts discussed in this section address the potential nuisance effects of noise and dust on farm operations which abut the access roads.

7.4.2.1 Increased Noise Levels

Increased noise levels along the access roads were forecast by S.S. Wilson and Associates (1987) for the construction period and for plant operations in 1995 (150,000 t/a) and 2000 (300,000 t/a). The analysis took into account predicted traffic volumes on access roads and the increase in cars and trucks due to OWMC activities.

At the peak of construction, (April, 1991) the addition of the OWMC traffic will increase the noise levels by approximately 1.0 dBA along Highway 20 between Regional Road 24 and Schram Road. Along all other sections of the road, including the area west of Schram Road, the increase in noise levels will be less than 1 dBA.

For operations in 1995 and 2000, the increase in noise levels due to OWMC traffic will be less than 2 dBA along all sections of the proposed access route except for the section of Schram Road between Highway 20 and the site entrance. The increase in noise levels due to OWMC-related traffic along this section of the Schram Road will be 12 dBA in 1995 and 15 dBA in 2000.

These noise impacts are not considered to be significant. Increases below 3 dBA are "hardly perceptible" (see Section 7.3.2.1); while along Schram Road where higher noise level increases are expected, there are no barns or residences within 240 m of the impacted zone.

7.4.2.2 Dust

Dust emissions due to OWMC traffic along access roads are estimated to increase slightly and to have a minimal effect relative to existing dust levels in the area (Ontario Research Foundation, 1987). Significant impacts on agriculture from traffic dust are not therefore expected.

7.4.2.3 Concerns of Adjacent Farmers

A total of 18 farm respondents along Regional Road 24 outside the local community area completed an access road survey for farm operators (see Appendix A-2). Seventy-two percent of these farmers indicated that existing traffic conditions affect their farming activities. Damages to crops, cited by 39 percent of the farmers, were associated with dust and salt spray from passing vehicles. Twenty-two percent also felt that produce sales have been affected.

The majority of farm respondents (75 percent) indicated that OWMC-related traffic would also affect their farm operations. Thirty-eight percent indicated that field crops or tree fruits would be affected. Crop damage was expected to occur as a result of higher levels of air pollution and salt spray from increased traffic levels.

One survey question asked respondents whether or not plans to improve their house or property were put on hold because OWMC had selected

Regional Road 24 as a preferred access road. Thirty-eight percent of the farm respondents answered in the affirmative, suggesting that declining property values would prevent recovery of investment capital. One farmer was considering sale of his farm, and another said he had delayed planting of fruit trees because of expected damage by salt spray.

The survey suggests that existing traffic on Regional Road 24 causes concern to farmers who work adjacent properties. Many of these operators also expect adverse effects from OWMC-related traffic.

The concerns expressed by four operators on access roads within the local community were not unlike the concerns of those mentioned above (Appendix A-1). Nuisance effects cited by one or more operators included increased levels of fumes and noise. There were no comments specifically about crop or tree fruit damage, as raised by operators located along Regional Road 24. This is to be expected in the case of tree fruits, as none are grown along the access route in the local community.

7.4.3 FARM PRODUCTIVITY IMPACTS

Farm productivity could conceivably be affected by noise and dust from traffic, by traffic interference with farm vehicles using the access road and by contamination from spills occurring along the access road.

Predicted noise and dust levels along access roads are minimal (see Section 7.4.2) and are not expected to affect farm productivity. The following sections address traffic interference and spills.

7.4.3.1 Interference With Farm Vehicles

This section discusses the potential for interference of farm vehicles by OWMC-related vehicles. It also identifies sections of the access route that have the highest potential for interference with farm machinery, farm service vehicles, and customer vehicles stopping at roadside stands and `pick your own´ fruit and vegetable farms. Interference relates both to impedance of farming activities and to risks of vehicle accidents.

The preferred access route varies over its length from a four lane road with parking lanes but no shoulders to a two lane gravel road (Table 7.10). Baseline traffic volumes for links of this route were forecast without the OWMC facility for 1990 (construction period), 1995 (150,00 t/a operation) and 2000 (300,000 t/a operation) by M.M. Dillon Ltd. (1987b). These are shown in Table 7.11 along with truck volume information and forecast accident levels. Changes in traffic volumes and accident levels predicted as a result of OWMC facility development are shown in Table 7.12.[48] Data in these three tables are used below in assessing traffic interference effects.

Farm Machinery: Potential conflict between OWMC facility-related traffic and farm machinery traffic will be greatest:

- where marked increases in traffic volumes are expected;
- where farm vehicle traffic is heaviest along the access roads;
- at peak seasonal periods of use by farm vehicles (between the months of April and October);
- during shift changes at the facility over its operational life;
- where intersections or other features result in greater intrusion of farm vehicles into traffic lanes.

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[48] The reported accident data are for all vehicles including farm machinery. The frequency of farm equipment accidents along the proposed access route were examined separately by M.M. Dillon. On the basis of historical information, M.M. Dillon concluded that farm equipment movements have been relatively safe. Only two accidents involving farm equipment between 1983 and 1985 were reported on the entire length of the access route.

TABLE 7.10

CHARACTERISTICS OF PREFERRED LOCAL AND REGIONAL ACCESS ROADS

LINK DESCRIPTION	LENGTH (km)	NUMBER OF LANES	PAVED WIDTH (m)	SHOULDER WIDTH (m)	RIGHT OF WAY (m)	COMMENTS
Vineland Townline Road (R.R. #24)						
QEW to R.R. #81	3.8	4	14	0	20.1	2 parking lanes
R.R. #81 to Moyer	0.7	4	14	0	20.1	1 parking lane
Moyer to R.R. #73	1.1	3	10.4	2.4	26.2	southbound truck climbing lane
R.R. #73 to Ninth	3.5	2	6.7	2.75	26.2	
Ninth Ave. to R.R. #216	3.0	2	6.7	2.15	30.5	
R.R. #216 to Hwy. 20	4.1	2	6.7	2.15	30.5	
Highway 20						
R.R. #216 to Hwy. 20	5.1	2	6.7	2.15	30.5±	right of way railroad overpass
Schram Road						
Hwy. 20 to site	0.9	2	6.1[1]	0.9	20.0	gravel road

Source: M.M. Dillon, 1987b.

[1] This is a road bed width, Schram Road not being paved.

TABLE 7.11

BASELINE TRAFFIC CONDITIONS WITHOUT OWMC

	AVERAGE ANNUAL DAILY TRAFFIC (1,000's vehicle)			TRUCK VOLUME	ALL VEHICLE ACCIDENT INVOLVEMENT - ANNUAL		
	1990	1995	2000	(%)	1990	1995	2000
Vineland Road (R.R. 24)							
QEW to R.R. 81	9.9	12.1	14.8	19	31	38	47
R.R. 81 to Moyer Road	9.2	11.8	15.1	22	13	16	21
Moyer Road to R.R. 73	9.2	11.8	15.1	22	3	3	4
R.R. 73 to Ninth Ave.	7.1	8.7	10.7	22	25	31	38
Ninth Ave. to R.R. 216	6.7	7.7	8.9	22	20	23	26
R.R. 216 to Hwy. 20	5.6	6.5	7.5	22	21	25	28
Highway 20							
R.r. 24 to Schram Rd.	3.5	3.6	3.7	16	9	9	9
Schram Road							
Hwy. to 20 to facility site	0.13	0.15	0.16	3	<1	<1	<1

Source: M.M. Dillon, 1987b.

TABLE 7.12

COMPARISON OF ESTIMATED OWMC TRAFFIC TO BASELINE TRAFFIC

	OWMC TRAFFIC VOLUMES[1]			OWMC TRAFFIC ACCIDENT INVOLVEMENT[1,2]	
	1990	1995	2000	1995	2000
	- - - 1,000's/work day (% change) - - -[3]			- - -no./a (% change)- - -[3]	
Vineland Road (R.R. 24)					
QEW to R.R. 81	0.20 (2.0)	0.064 (0.5)	0.12 (0.8)	0.18 (0.5)	0.36 (0.7)
R.R. 81 to Moyer Road	0.20 (2.2)	0.064 (0.5)	0.12 (0.8)	0.080 (0.5)	0.16 (0.8)
Moyer Road to R.R. 73	0.20 (2.2)	0.064 (0.5)	0.12 (0.8)	0.017 (0.6)	0.033 (0.8)
R.R. 73 to Ninth Ave.	1.2 (16.2)	0.064 (1.8)	0.28 (2.6)	0.42 (1.3)	0.83 (2.2)
Ninth Ave. to R.R. 216	1.2 (17.2)	0.064 (1.8)	0.28 (3.1)	0.40 (1.5)	0.69 (2.7)
R.R. 216 to Hwy. 20	1.2 (20.6)	0.064 (2.2)	0.28 (3.7)	0.45 (1.8)	0.89 (3.2)
Highway 20					
R.R. 24 to Schram Rd.	1.5 (43.2)	0.20 (10.2)	0.59 (16.0)	0.69 (7.7)	1.1 (12.8)
Schram Road					
Hwy. 20 to facility site	2.0 (1509.2)	0.36 (354.7)	0.81 (506.0)	0.18 (179.0)	0.30 (296.0)
OWMC Traffic Condition	Peak Month Construction	150,000 t/a Operation	300,000 t/a Operation	150,000 t/a Operation	300,000 t/a Operation

Source: M.M. Dillon, 1987b.

[1] Estimates include truck and employee traffic
[2] Accident predictions not available for 1990
[3] % change measured relative to baseline in Table 7.10

High levels of farm machinery use occur along the length of Regional Road 24 from the QEW to the intersection with Regional Road 216 (Table 7.13). The most farm traffic, based on traffic density per kilometer of access road length, occurs in the north end of this stretch from Regional Road 81 to Regional Road 73. This farm machinery traffic, while exposed to the highest existing traffic levels along the access route, benefits from features such as extra lanes in Vineland and wider, unobstructed shoulders south of Vineland.

Predicted increases in traffic volume on Regional Road 24, shown in Table 7.12, range up to 20.6% during the peak construction period but are generally small (0.5% to 3.7% of baseline). Similarly, accidents are not expected to increase by a significant amount. Most interference on Regional Road 24 will occur north of the intersection with Regional Road 216 during operations and from Ninth Avenue south during construction.

Highway 20, which is similar in width and general character to the southern portions of Regional Road 24 along the access route, has baseline traffic volumes and accident levels that are much less than on Regional Road 24. Nor are there as many farm machinery movements along this road. On the other hand, forecast OWMC traffic levels along Highway 20 are higher than on Regional Road 24 in both absolute and relative terms; a 43% increase in traffic volume during construction being particularly notable.

Although Highway 20 is reasonably wide in most areas, a potential for conflict between OWMC facility traffic and farm machinery traffic exists at the railway overpass near the intersection of Highway 20 and Boyle Road. The two lanes beneath the overpass are relatively narrow due to the exclusion of road shoulders. Therefore, farm machinery units approaching the overpass must ensure that their side of the road is clear of traffic before they leave the shoulder of the road and enter the overpass.

TABLE 7.13

ANNUAL FARM MACHINERY USE OF THE OWMC ACCESS ROUTE

	TOTAL DISTANCE TRAVELLED (km)	DISTANCE TRAVELLED PER KM OF ROAD (km/km)
Vineland Road (R.R. 24)		
QEW to R.R. 81	4,280	1,130
R.R. 81 to Moyer Road	3,960	5,650
Moyer Road to R.R. 73	4,780	4,340
R.R. 73 to Ninth Ave.	5,760	1,650
Ninth Ave. to R.R. 216	4,690	1,560
R.R. 216 to Hwy. 20	1,330	330
Highway 20		
R.R. 24 to Schram Rd.	3,730	700
Schram Road		
Hwy. 20 to facility	1,140	1,260

Source: Based on responses to Phase 4B (1986) and 4A (1984) farm and access road surveys.

Among respondents to the 1986 farm survey, three farm operators reported that they farm parcels of land which must be accessed via the overpass. Because of their large size and their cash crop activity, two of the farm operations make extensive use of the railroad overpass throughout the growing season. The third farmer has hay on a small parcel of land, and makes fewer trips through the overpass. There may also be other farm operators headquartered outside the study area who use Highway 20 for moving farm machinery.

Schram Road has less traffic than Highway 20, a moderately high intensity of farm machinery use and the highest levels of OWMC traffic volume of all the access roads (Tables 7.11, 7.12, 7.13). Any interference will be exacerbated by relatively narrow road and shoulder widths (Table 7.10).

Because of local road configurations, Schram Road is an important north-south link between Highway 20 and Wellandport for farms in the Silverdale area. To the west of Schram Road there is no other north-south road link for approximately 4 km. Several hundred metres to the east of Schram Road is a narrow, unimproved road (Gee Road). However, because of the narrow road width, most farm machinery would block two-way traffic flow. The closest improved road to the east (Boyle Road) is located approximately 3 km from Schram Road. Thus, Schram Road is a convenient, direct and safe means of accessing agricultural services in the Wellandport area.

Seasonally heavy use of Schram Road is also made by farmers headquartered south of Highway 20 who move farm machinery to other parcels of land associated with their operations. Five farms in the 1986 survey reported farm machinery-related use of Schram Road. Most of this use occurred between April and October. The Ministry of Revenue farm property ownership information suggest that there may be at least two other farmers using Schram Road.

Customer Stops: The number of customer stops, shown in Table 7.13, was obtained from the Phase 4A and 4B interviews with farm operators whose headquartered properties abut the access roads. This information reveals that the greatest potential for interference with OWMC-related vehicles will occur along Regional Road 24 from the QEW to Regional Road 81. Here, there are approximately 38,000 customer stops yearly at farm retail fruit stands, pick-your-own operations and processing plants. Other concentrations occur between Moyer Rd. and Ninth Avenue (4265 stops) and along Highway 20 (520 stops). Approximately half of these stops are at horse farms.

Service Vehicles: The number of service vehicle stops reported in the interviews with farm operators whose headquartered properties abut the access roads was also determined (Table 7.14). These vehicles include milk, feed, fuel, livestock, and fruit transport trucks.

The greatest potential for interference with service vehicles occurs along Regional Road 24 from the QEW to Regional Road 81 where approximately 1,500 yearly stops by trucks are reported (Table 7.14). Ninety-five percent of these stops are by trucks transporting fruit to processors and markets.

Along Highway 20, between Regional Road 24 and Schram Road, milk, feed, fuel and livestock trucks make approximately 1,100 stops per year.

Farmer Attitudes and Concerns: Along Regional Road 24, 56% of farm operators responding to Phase 4A and 4B surveys expressed concern about conflict between slow moving farm vehicles and existing traffic. There was also some perception that service and customer vehicles were being affected. Fifty percent of the respondents on Regional Road 24 felt that OWMC traffic would affect farm vehicle movements and increase the risk of accident.

TABLE 7.14

CUSTOMER AND FARM SERVICE VEHICLE STOPS FOR THE OWMC PROPOSED ACCESS ROUTE

	CUSTOMER STOPS no. per year	SERVICE VEHICLE STOPS no. per year
Vineland Road		
(R.R. 24)		
QEW to R.R. 81	38,250	1,440
R.R. 81 to Moyer Rd.	0	0
Moyer Rd. to R.R. 73	1,000	35
R.R. 73 to Ninth Ave.	3,265	730
Ninth Ave. to R.R. 216	12	276
R.R. 216 to Hwy. 20	25	168
Highway 20		
R.R. 24 to Schram Rd.	520	1,111
Schram Rd.		
Hwy. 20 to facility entrance	0	0

Source: Phase 4A (1984) and 4B (1986) farm surveys.

Farm operators on access roads in the local community expressed similar concerns about existing traffic and about the increased risk of accident they associated with OWMC traffic.

Severity of Interference Impacts: The analyses summarized above suggest that the greatest potential for traffic interference with farm machinery will occur along Highway 20 and Schram Road while customer and service vehicle stops are most affected at the north end of Regional Road 24. Impacts along Regional Road 24 are not likely to be significant in light of the high existing traffic levels on this road; forecast changes in traffic levels are generally marginal. Such is not the case on Highway 20 and Schram Road where, due to lower existing traffic levels, changes are relatively large and may be significant.

7.4.3.2 Access Road Risks

This section considers the implications to agriculture of spills of potentially hazardous materials along the access road.

The hazard associated with spills of wastes along the access road depends on the potential for spills to damage crops and livestock and on the frequency of spills. Environ (1988) indicates that while spills of special wastes onto the roadway are predicted to occur on average once every 10.5 years for a facility handling 150,000 t/a of wastes, spills which can potentially cause some type of adverse effect will occur only every 132 years. Only one tenth of these will likely involve the most hazardous waste to be received by the OWMC facility - waste contaminating methylene chloride.

An analysis of exposure levels involving a spill of methylene chloride revealed that exposure levels for dairy cows standing near the spill for one hour could exceed the criterion dose for acute exposure by a factor of 7 (Environ, 1988). Adverse effects of this level of exposure would be reversible.

An evaluation of spills involving wastes entering Twenty Mile Creek also suggested the potential for adverse effects on livestock watering in the creek though a quantitative analysis of this risk was not done.

The likelihood of the accident scenarios discussed above is very low. There is however, a strong perception among farm respondents in the Phase 4B survey of a risk of transportation accidents involving spills (see section 7.3.3.3, Table 7.3). This perception, and the finding that adverse effects may occur suggest that access road risk is a potentially significant impact of the proposed facility. Spill-related effects would be localized around the site of the spill and potentially downstream of the site.

7.5 REGIONAL IMPACTS

On a regional scale, the principal agricultural concern relates to the risk of adverse effects on crops and livestock from atmospheric emissions of contaminants. The analysis of such impacts in close proximity to the site indicated that adverse effects are not likely to occur (Section 7.3.3.3). Consequently, no adverse effects are expected at a regional scale based on predicted emission levels.

Additional regional economic effects in the farm community could potentially arise as a result of local farm displacements and changes in local income and employment levels. Regional economic impacts arising from total changes in employment due to the facility are not however expected to be significant (Morehouse Economic Planning Consultants, 1987). Any changes in the agricultural sector of the local economy are likewise not expected to impact significantly on the regional economy.

7.6 SUMMARY OF IMPACT ANALYSIS

The assessment of facility impacts in this chapter has assumed no impact management measures other than certain on-site mitigation features such as perimeter berms. The assessment has been conducted relative to the following impact factors:

- Farm Displacement
- Loss of Farmland
- Farm Family/Farm Operator Disruption
- Farm Productivity Effects
- Farm Business Effects
- Agricultural Community Effects
- Agribusiness Effects

These impact factors have been considered on-site, in the local community and region, and along the access route. Within the local community the assessment of farm family/farm operator disruption by nuisance effects led to the delineation of two impact zones identified as the direct and indirect impact zones.

A systematic evaluation of the significance of impacts is documented in Appendix E and summarized in Table 7.15. Findings are summarized below.

Based on predictions of changes resulting from the construction and operation of the OWMC facility, it was concluded that several direct impacts were not likely to be significant. Losses of farmland both on and off-site will be minor and will not involve highly productive soils, i.e. Class 1 or 2. Similarly, the facility is not expected to create physical conditions that would pose a significant constraint to farm productivity

TABLE 7.15

SUMMARY OF AGRICULTURAL IMPACT ASSESSMENT PRIOR TO IMPACT MANAGEMENT

ZONE	FACTOR	INDICATOR	ASSESSMENT OF SIGNIFICANCE
Site	Farm Displacement	- Total Displacement of Farms	- DET, CER, PERM; significant to two affected operators who lose livelihood and home but not to community at large
	Loss of Farm Land	- - -	- DET, CER, PERM; because of small area involved, loss not significant to agriculture
Local Community	Farm Displacement	- Partial Displacement of Farms	- DET, CER, PERM; significant to affected operator who needs land to support dairy herd; not significant to community at large
	Farm Family/Farm Operator Disruption	- - -	- DET, CER, LT; significant impact, several farms within zone of low to high cumulative nuisance effects, six with high levels of impact, noise guidelines exceeded
	Farm Productivity Impacts	- Exposure to Nuisance Effects	- negligible impacts of noise and dust on crops or livestock; no technical evidence of sensitivity
		- Atmospheric Emission Effects	- DET, UNCER, LT; potentially significant impact; no technical evidence of injury to crops and livestock due to routine emissions; potential for injury under upset conditions; widespread perception of risk
		- Downstream Agricultural Activity	- negligible impact on livestock watering, small magnitudes; low sensitivity
	Farm Business Impacts	- Decrease in Property Value	- DET, UNCER, TEMP; potentially significant impact on farm plans; widely anticipated by local farmers

NOTE: DET = detrimental, BEN = beneficial; CER= certain, UNCER = uncertain;
PERM = permanent, TEMP = temporary; GRAD = gradual, ongoing, LT = long-term

TABLE 7.15 - cont'd

SUMMARY OF AGRICULTURAL IMPACT ASSESSMENT PRIOR TO IMPACT MANAGEMENT

ZONE	FACTOR	INDICATOR	ASSESSMENT OF SIGNIFICANCE
		- Loss of Product Sales	- DET, UNCER; potentially significant impact on certain farmers, sensitive to consumer attitudes; widely expected by farmers
	Agricultural Community Impacts	- Out-Migration of Farm Operators	- DET, UNCER; a number of farmers expected to leave but other operators will likely start-up, possible loss of livestock operations; significant impact on community
		- Non-Farm In-Migration	- DET, UNCER, GRAD; OWMC employees may move on to farm land, loss of land base for agriculture, farm/non-farm conflicts; low to moderate significance
		- Erosion of Community Networks	- DET, UNCER, GRAD; little impact under most likely out-migration scenarios; low to moderate significance
		- Off-Farm Employment with OWMC	- BEN/DET, UNCER, GRAD; viewed favourably by community, potentially significant benefit to some farm families, could result in erosion of full-time farming; low to moderate significance
		- Change in Local Agricultural Character	- DET, UNCER, GRAD; potential erosion of land base and livestock activity, shift to part-time or hobby farms and cash cropping; moderate to high significance
	Agribusiness Impacts	- - -	- DET, UNCER; transitory loss of sales revenue after out-migration, potentially significant to small operators; not significant to community at large

NOTE: DET = detrimental, BEN = beneficial; CER= certain, UNCER = uncertain;
PERM = permanent, TEMP = temporary; GRAD = gradual, ongoing, LT = long-term

TABLE 7.15 - cont´d

SUMMARY OF AGRICULTURAL IMPACT ASSESSMENT PRIOR TO IMPACT MANAGEMENT

ZONE	FACTOR	INDICATOR	ASSESSMENT OF SIGNIFICANCE
Access Road	Loss of Farmland	- - -	- DET, CER, PERM; negligible impact, small area of CLI Class 3 soil
	Farm Family/Farm Operator Disruption	- - -	- negligible noise and dust effects expected
	Farm Productivity	- Exposure to Nuisance Effects	- no impact expected
		- Interference with Farm Vehicles	- DET, CER, LT; high farm vehicle traffic levels, large increases in traffic volumes along certain roads; a concern expressed by potentially affected operators; low probability of serious impact
		- Access Road Risk	- DET, UNCER; potentially significant impact, low likelihood of injury, widespread perception of risk
Region	Farm Productivity Impacts	- Atmospheric Emission Effects	- negligible effects

NOTE: DET = detrimental, BEN = beneficial; CER= certain, UNCER = uncertain;
PERM = permanent, TEMP = temporary; GRAD = gradual, ongoing, LT = long-term

around the site or along the access route. Sources of impact considered in this respect were noise, dust, disruption of off-site stream flows and contaminants spills or emissions.

The displacement of on-site farms and off-site farms with on-site land is significant from the perspective of the affected farm operators. Two dairy farmers and one semi-retired farmer would be affected. The impact on the dairy farms would be significant, both being active operations. The on-site operator must close down while the off-site operator would lose land that is needed to support the existing operation.

The latter operation, with on-site land, is one of a group of six farms which will experience significant disruption from a combination of noise, visual and dust effects from facility construction and operation. All six operations are full time and five of the six are established livestock operations.

Fifteen other farms within the direct impact zone would experience moderate to high impact for at least one of several nuisance effects and all are subject to cumulative nuisance effects. Beyond the DIZ, several operations would experience moderate levels of visual impact.

Significant disruption can also be expected along the access route. High existing traffic volumes along Regional Road 24 mean that incremental effects of OWMC traffic are relatively small but there are many affected receptors including farm vehicles, farm gate customers and service vehicles. Fewer receptors would be involved on Highway 20 and Schram Road, but incremental increases in traffic volume would be large along these roads and certain road conditions may exacerbate interference problems. Farm operators are concerned about the potential for accidents with OWMC-related traffic.

The farm public is concerned with direct effects such as noise, dust, odours and, in particular, contaminant spills and emissions. While the latter are unlikely to pose a significant risk to agriculture, the concern about contamination is a major factor that needs to be addressed.

A variety of indirect impacts is anticipated as a result of the facility. An expected depression of farm real estate sales in the DIZ may have a significant impact on the near-term financial planning of affected farmers. While there are fears that sales of farm products may also be affected by consumer reaction to the facility, products from the local community do not lend themselves to strong consumer recognition; therefore sales impacts are not predicted.

Perhaps the most significant long-term agricultural impact would be felt at the community level. Some out-migration of farm operators is expected, the most likely scenario involving the departure of a number of operators in the DIZ who would experience cumulative nuisance effects and concerns about risk. Their departure would represent a direct loss of productive capacity, particularly where livestock and quotas are involved. Their departure would also disrupt existing community networks and farm organizations. Other farmers will likely to take up the vacated land but non-farmers may also occupy farm properties. The end result of these changes could include a shift away from livestock-based operations, an increase in farm land rentals, an overall reduction in cultivated farm land, a higher proportion of non-farm rural residents and farm/non-farm land use conflicts.

The potential loss of farms and farm production would have a secondary effect on agribusiness. Smaller local establishments or contractors such as custom operators are most vulnerable to the loss of business. However the overall impact on agribusiness will be minimal.

Finally, impacts at a Regional scale whether direct or indirect will also be minimal.

CHAPTER 8

RISK AND IMPACT MANAGEMENT AND RESIDUAL IMPACTS

8.1 INTRODUCTION

The previous chapter identified potential agricultural impacts associated with the proposed OWMC facility and provided an assessment of the significance of those impacts. This chapter identifies the programs and policies which OWMC and its consultants have considered for managing impacts on the surrounding community, including impacts to agriculture. The effectiveness of these impact management measures in mitigating predicted agricultural impacts is assessed. Any remaining or residual impacts to agriculture are identified.

Following the first section which introduces impact management measures, the structure of this chapter generally parallels that of Chapter 7 to allow the reader to readily refer to the previous discussion of impacts. Each section of this chapter presents the impact(s) identified in Chapter 7, analyses the implications of the proposed impact management measures and assesses the extent to which there would be residual impacts to agriculture. Several recommendations for impact management are also introduced.

8.2 IMPACT MANAGEMENT MEASURES

This section outlines the principal impact management measures that have been considered by OWMC and its consultants to reduce and control impacts associated with the facility and its operation. These include mitigation and compensation measures as well as monitoring, communication and contingency programs (OWMC, 1988).

8.2.1 MITIGATION MEASURES

Mitigation measures are intended to reduce the level of impact on receptors; they relate to specific types of impacts as follows:

Visual Intrusion - on-site plantings to screen buildings and outside areas that are lit at night, site design and landscape treatments that are as compatible as possible with the existing rural landscape, direction of all lighting downward and inward, interaction with local land owners to encourage preservation of existing woodlots and hedgerows as visual screens, additional off-site plantings of visual screens.

Noise - restrict landfilling and truck movements to daylight hours, on-site perimeter berm (1 to 5 m), central air conditioning and upgraded window glazing on eligible residences, noise barriers around outside living areas.

Dust - paving of on-site roads, phasing of construction activity, wetting of unpaved construction roads, control of equipment and vehicle speeds on-site, dust control at exposed soil surfaces (e.g. wetting, covering, compaction or revegetation), washing of vehicles leaving the site, cleaning of paved roads.

Emissions (Incinerator, Evaporator, Fugitive) - various facility design features and operational procedures to minimize escape of compounds that could pose a risk to off-site receptors or that may cause nuisance (e.g. odours).

Transportation - driver training, vehicle inspections, realign and upgrade Schram Road and Highway 20 intersection, left turn lane off Highway 20, use approved list of waste haulers, contractual agreements with waste haulers to enforce use of designated access routes.

8.2.2 COMPENSATION MEASURES

Compensation measures do not change the level of impact but rather provide the receptor with some form of benefit that is intended to offset the harm done by adverse impacts. These measures are intended to redress significant adverse impacts that cannot be fully mitigated. The main proposals are as follows:

Property Value Protection Program (PVPP) - This program guarantees fair market value to current and new owners of properties within the DIZ. If an owner is unable to obtain a fair offer for listed property, OWMC will purchase the property at a fair market price and offer it for resale on the open market. The program would be put in place once all approvals have been acquired for the facility and would remain in place as long as needed.

Buy-Out Program - Within the DIZ, certain properties have been identified where high cumulative impacts would occur and would likely remain at unacceptable levels even after mitigation measures have been applied. OWMC is proposing a "Buy-out" policy for these most severely affected properties. Discussions with individual property owners would include an offer to purchase the properties. OWMC would also assist each household with relocation costs.

Financial Security Policy and Mechanisms for Resolving Claims - This policy recognizes the need for OWMC to be fully insured for long-term liability coverage against incidents arising from normal operations (resulting in small claim actions), incidents arising from uncontrolled emissions or spills, and incidents arising from long-term impairment of the environment.

To facilitate the resolution of claims without prolonged legal and court proceedings, a special unit within OWMC will be responsible for responding to complaints and administering claims. Where necessary, the services of a third party agreeable to all concerned would be obtained.

Hardship Policy (Special Case) - This policy is intended to process any request for mitigation or compensation from a property owner or tenant not automatically covered under other OWMC impact management measures. All residents of the Regional Municipality of Niagara will be covered by this Policy.

Such cases will be reviewed on a case-by-case basis, with the claimant required to demonstrate a plausible cause and effect relationship between the effects and the facility activities. Evidence from monitoring programs or independent specialists may be used to assess specific hardship claims. In resolving claims, OWMC will place priority on mitigation measures to prevent or minimize impacts in the long-term.

8.2.3 MONITORING, COMMUNICATION AND CONTINGENCY PROGRAMS

In addition to mitigation and compensation measures noted above, impact management will encompass programs for monitoring impacts, for dealing with unpredicted effects as they arise and for communicating with the affected public. Such programs will facilitate the implementation of mitigation and compensation measures, and can help to prevent or dispel distorted perceptions of the nature of facility effects, or to minimize the adverse impact of uncertain or accidental effects.

The principal programs in this category are:

- monitoring of on and off-site biophysical impacts including air, soil and water quality as well as crop and livestock effects, dust, noise and odours.

- on-going refinement and modification to facility design and operation procedures in response to monitoring evidence that emissions are injurious or otherwise unacceptable.

- monitoring of social and economic indicators such as property value and land use.

- establishment of an OWMC/community monitoring committee to assure local input into monitoring programs.

- waste transport program involving assistance in driver training, truck inspections, access-route use designations, transport scheduling, and truck movement monitoring.

- assistance to municipalities in emergency response planning, staff training, and program implementation.

- maintenance of an on-site emergency response team.

- establishment of a complaints bureau.

- establishment of an information program directed to the affected public and providing access to monitoring data.
- establishment of staff information programs to foster an understanding of and involvement in the local community.
- ongoing discussions with government and nongovernment organizations representing interests of the affected publics.
- provision of alternative water supplies in case of contamination.
- provide a plan for site closure for decommissioning.

These various programs are an integral part of the impact management process. They will have a bearing on the degree of impact actually experienced and the nature and magnitude of residual impacts. In Chapter 9, monitoring and contingency measures are recommended.

8.3 ON-SITE IMPACTS

The above-noted impact management measures apply only to off-site properties. On-Site property owners will be eligible for compensation under provisions of the Ontario Expropriations Act.

8.3.1 FARM DISPLACEMENT - TOTAL DISPLACEMENT OF FARMS

Under the provisions of the Ontario Expropriations Act property owners with land on-site will be fully compensated for the value of the property and for the costs of finding and relocating to acceptable new properties.

Provisions for the purchase of the 14 ha parcel of land located adjacent to the site's southern boundary and belonging to one of the on-site operators, should be made. This parcel does not have the potential to stand alone as a viable farm unit and therefore should be purchased as part of the operation located on-site.

Financial impacts incurred by on-site farm operators are minimized under the application of these measures. Residual impacts relate to noneconomic personal loss as well as adverse community impacts. The latter are not considered to be significant from an agricultural perspective (broader social impacts are evaluated by the Institute of Environmental Research, 1988).

8.3.2 LOSS OF FARMLAND

The loss of farm land on-site is unavoidable. This loss is not significant in a regional or provincial context. Nevertheless, it could be partially offset by off-site measures such as drainage improvements or windbreak plantings to enhance local productivity. Windbreak plantings would also help screen the facility from view. These practices would be most feasible on any off-site lands purchased by OWMC.

8.4 LOCAL COMMUNITY IMPACTS

8.4.1 FARM DISPLACEMENT - LOSS OF ON-SITE LAND BY OFF-SITE FARMS

One farm operation located off-site will lose on-site land. This land is needed to maintain the dairy operation at its current size (see Section 7.3.1).

Under expropriation procedures applying to on-site property, any injurious effects of the loss of this land will be mitigated thus largely eliminating partial displacement effects.

An equivalent property must be close at hand, cleared and ready to work, have a similar capability for agriculture and be available at a reasonable cost. To the extent that full compensation is provided under provisions for expropriation, the monetary settlement should reflect the agricultural value of the existing on-site property and should be adequate to enable its replacement by an equivalent property or to compensate for any loss if only less attractive properties are available. Moreover, compensation should cover any losses incurred during the period when a new property is being acquired and then incorporated into the operation´s existing rotation.

With adequate compensation, no residual impacts are forecast as a result of the partial displacement of the farm operation in question. However, since the operator in question will likely experience other significant unmitigatible impacts (Section 7.3.1), he will be covered under OWMC´s "Buy-out" policy within the Property Value Protection Program. Under this guaranteed purchase policy, relocation costs will be covered. If the buy-out offer is accepted, partial displacement will no longer be an issue.

8.4.2 FARM FAMILY/FARM OPERATOR DISRUPTION

The potential for reduction or prevention of certain nuisance effects has been assessed by site assessment consultants.

Mitigation of noise effects has been evaluated for all properties with a high or moderate noise impact rating (S.S. Wilson and Associates, 1987). All of the farm properties with high noise impacts have these impacts reduced but, in only three cases, to a moderate rating after mitigation. Farm properties with moderate ratings would end up with low or negligible ratings. This change, however, applies only to the outside living area near the residence and not to cropland. The farm operator would still experience the unmitigated noise levels away from the shielded area.

Mitigation can achieve a marked reduction in visual impacts. The agricultural area exposed to high visual impact could be reduced from 480 to 290 ha (EDA Collaborative, 1987). Eight of the fifteen farm households with high visual impacts could have these reduced to moderate or low ratings. None of the affected households in this group would experience high cumulative impacts.

Residual effects persisting after mitigation of other nuisance effects were not evaluated quantitatively, but those effects (dust, odours) are not as significant as noise and visual intrusion.

The owners of properties in the DIZ may not wish to remain on their properties even with mitigation if they consider risk or residual impacts to be intolerable. Those properties experiencing high cumulative effects related to noise, dust and visual intrusion will be eligible for "buy-out." In these situations, the property will be purchased at fair market value and relocation costs will be covered so that financial impacts are minimized.

Those properties which are less significantly affected than the "buy-out" properties within the DIZ will be covered under the PVPP. While this may be effective in stabilizing land value, it could also induce more farmers to put their farms on the market, knowing that there is a guarantee of receiving a fair market price for their farms.

A residual agricultural impact associated with the PVPP is the potential drop in production from affected land, particularly if livestock activity is lost, if land is farmed on a short-term rental basis or if it becomes idle. Agricultural production from these farms is more likely to be restored by the resale of acquired land to farmers or by negotiation of long-term lease arrangements with farm operators. To promote sales to farmers, land could be resold, where possible, in large blocks; this implies that contiguous properties acquired by OWMC only be resold as single units. If properties are acquired gradually, then retention of title for some time may be advantageous if it would permit assembly of larger land parcels.

The PVPP does not address the needs of those farm operators who choose to stay. Such persons might prefer to mitigate facility effects by moving their house to a less disrupted part of their property. Alternatively, they may wish to relocate to another property they own which is more distant from the site, and continue to farm the headquarter property rather than sell to OWMC. These options could minimize unfavourable impacts on agriculture due to the "buy-out" or PVPP and are therefore recommended as additional mitigative measures for farmers who are eligible for "buy-out."

For some farm operators within the DIZ, circumstances may warrant compensation efforts beyond assuring a fair market value for their property. There are individuals, for instance, whose retirement plans have been altered because of the siting. Such individuals will have recourse to OWMC's Hardship policy to cover exceptional costs arising from their predicament.

The perceptions of facility effects held by many farm operators within the direct impact zone indicate that they are expecting greater nuisance effects than site assessment consultants have predicted. Such perceptions can affect the farm family/operator's willingness to commit themselves to farming in the area in the long-term. An ongoing dialogue should take place between OWMC and farm operators to dispel any misconceptions regarding levels of predicted facility impacts. Such dialogue may require a level of interaction that is more intensive than is currently envisioned for the information program. To be successful it may require that key individuals such as agricultural extension staff, agribusiness representatives and community leaders be invited to participate in the dialogue with OWMC representatives.

Agricultural impacts due to nuisance effects are expected to be of low significance outside the DIZ, but some properties are located within the moderate visual impact zone, and some may experience other unanticipated impacts. Should instances arise in which farm operators located beyond the DIZ feel they have experienced significant impacts due to facility effects, they will have recourse to OWMC's Hardship Policy. They can also request that the provisions of OWMC's PVPP be extended to cover their properties.

8.4.3 FARM PRODUCTIVITY IMPACTS

The impacts to farm productivity resulting from exposure to nuisance effects (noise, dust, odours), atmospheric emissions and water use downstream of the site were examined in Section 7.3.3.

No adverse productivity effects were predicted due to nuisances, although some concern has been expressed by local farmers about noise impacts on poultry housed close to the site.

Downstream agricultural water uses are not expected to be significantly impacted.

Routine atmospheric emissions are not expected to cause productivity impacts though spills or upset conditions could result in injury to crops and livestock. The uncertainty in predictions of risk to crops and livestock implies that predictions must be verified through monitoring. With any indication from monitoring programs that emissions are exceeding standards or having an unacceptable impact on farm products, OWMC will undertake to modify facility design or operations to reduce emissions to acceptable levels.

Although significant impacts to farm productivity are not anticipated, any farm operator who experienced impacts would have recourse to compensation through the Financial Security and Mechanisms for Resolving Claims policy. Evidence from monitoring programs will be available to help in confirming cases of injury when claims are made.

One difficulty that can be anticipated with any agricultural claim is that productivity normally varies from field to field, from one farm to the next and from year to year. Discerning productivity impacts under these circumstances will be difficult.

Monitoring of crop and livestock productivity may help to resolve this difficulty and will prove useful in providing early indications of facility effects. To be fully effective however, monitoring of productivity must be combined with expert evaluation of farm operations whenever concerns with productivity impacts are raised.

As noted earlier, OWMC could offset potential productivity losses by enhancing productivity in the local area particularly on off-site land that it acquires. Measures to do this include improvement of off-site municipal drains, encouragement of tile drainage and establishment of windbreaks. Efforts to overcome local soil limitations related to drainage using tile drainage will have the added benefit of reducing some of the inherent crop yield variability on area soils since crops are particularly sensitive to moisture stress on poorly drained soils. With tile drainage, droughty years will not depress yields to the same extent. This could make it easier to detect any yield effects caused by the facility.

Concern about risk associated with transportation accidents and water, crop and livestock contamination is apparent in the local community, regardless of the distance of residents from the site. These perceptions can directly impact on the farm family/operator's willingness to maintain existing operations in the long-term, and therefore affect farm productivity. A communications program with the community will help offset an adverse perception of risk provided that emission control efforts and compensation mechanisms are seen to be effective over time. Under these circumstances, residual impacts will be minimal.

After decommissioning, many of the potential productivity issues will cease. Effective weed management on-site will assure that new concerns are not created as a result of weed infestation in adjacent cropland areas that originate on-site.

8.4.4 FARM BUSINESS IMPACTS

8.4.4.1 Decrease in Property Value

Property value impacts in part reflect the expected magnitude of nuisance effects. Anticipated impacts may be reduced if on and off-site mitigation measures create a favourable impression among buyers in the real estate market.

Farm operator concerns with declining property value in the DIZ will be addressed through OWMC's PVPP, should they be interested in selling. In addition, this guarantee of land value protection should be sufficient to convince farm loans officers of the stability of land value and therefore assure farm operator access to credit.

Land value declines are not anticipated beyond the boundaries of the DIZ (Morehouse Economic Planning Consultants, 1987). If incidents arise which cause an unforeseen drop in land value, special consideration for compensation can be made under OWMC's Hardship Policy. Monitoring of real estate prices should assist in discerning the nature and extent of property value impacts and will help resolve claims under the hardship policy. Monitoring would also provide data to assess the need to enlarge the area of eligibility for the PVPP.

8.4.4.2 Loss of Product Sales

Loss of sales could potentially be a significant impact. Should cases of actual product contamination or of loss of buyers due to the mere presence of the facility arise, OWMC's Financial Security and Claims Policy will cover any associated liability.

Crop and livestock monitoring will provide a means of objectively assessing contamination issues. For the monitoring program to be fully effective, representatives of the farm community should provide input to its design and be able to review results with assistance of independent expert advisers.

An effective communications program is a key element in maintaining consumer confidence in products grown around the site. Open dialogue should be maintained with commodity and producer groups, and other farm organizations. Communications should also be maintained with wholesale buyers and consumer groups. In addition, the loss of farm gate sales could be addressed under the Hardship Policy.

8.4.5 AGRICULTURAL COMMUNITY IMPACTS

8.4.5.1 Out-Migration

As noted in the previous chapter, the number of farm families/operators potentially leaving the community cannot be estimated with any degree of certainty though small numbers of out-migrants can be expected. To the extent that OWMC's buy-out policy and PVPP encourage farmers to sell, the out-migration scenario is exacerbated. Conversely, other measures such as off-site mitigation, monitoring and information programs will act to reduce out-migration. A hiring policy favouring individuals from the local community would help to discourage out-migration.

Residual impacts to agriculture will be felt if land is not maintained in agriculture or deteriorates due to poor cropping practices under short-term rental agreements. These effects will be minimized if acquired farm properties are sold to local farm operations or if OWMC promotes the agricultural use of acquired land. In this respect, it is preferrable to assemble larger blocks of land which are less attractive to non-farm buyers. For acquired lands that are rented out, residual impacts can be minimized if long-term rental contracts should be established which stipulate good land management practices in order to prevent soil degradation.

8.4.5.2 Non-Farm In-Migration

Non-farm in-migration is not expected to be significant, and it may even have some beneficial impact on the community. The detrimental aspects of non-farm in-migration - namely, idling or loss of cropland, conflicts among neighbours over normal farming practices and erosion of farm community networks - can be partially offset by an OWMC staff information program that fosters an understanding of rural communities and that promotes local community activity.

An OWMC hiring policy that favours residents from communities within commuting distance would help reduce in-migration while a hiring policy that favours individuals with rural backgrounds could mitigate against the unfavourable impacts of in-migration.

8.4.5.3 Erosion of Community Networks

The greater the level of out-migration and in-migration, the greater the potential impact to community networks. This is particularly true if out-migrants move a distance which prevents maintenance of existing networks, and if in-migrants are largely non-farmers who are not likely to become involved in farm organizations.

Impact management programs and policies discussed above with respect to out- and in-migration will act to reduce adverse impacts on community networks. OWMC may also want to establish contact with local farm organizations through its information program in order to monitor community level impacts related to agriculture.

8.4.5.4 Off-Farm Employment with OWMC

Employment opportunities with OWMC will have a positive impact on the farm community if injections of off-farm income enable farm operations to survive in a depressed farm economy. Given the positive nature of this impact, mitigative efforts have little relevance to this impact. A local hiring policy would enhance this effect.

8.4.5.5 Change in Local Agricultural Character

Changes in the agricultural character of the local community will result from a combination of impacts from the OWMC facility and from external forces affecting agriculture in the community. The various impact management measures addressing specific effects such as out-migration or loss of product sales may help prevent deleterious community level changes. While OWMC can offer corporate support to municipal or regional policies that protect and enhance agriculture, there is likely to be little that it can do, apart from the specific types of measures discussed above, that would act to minimize broad community level changes.

8.4.6 AGRIBUSINESS IMPACTS

Overall, agribusiness impacts are not expected to be significant, though individual enterprises may experience more significant impacts if they have a small and local clientele base.

Agricultural supply and service companies and custom operators would experience a loss of sales as a result of farm out-migration. Some farm operators who do move out will likely stay within the same general area and therefore may well maintain their current agribusiness contacts. Others who consider moving, may be persuaded to stay if they feel that impact management measures and monitoring efforts sufficiently address their concerns.

OWMC's intent to keep acquired farmland in agriculture, along with the Township's implementation of land use controls should prevent a substantial erosion of agriculture and thus of agribusiness income. Shifts in the types of farm (i.e. from livestock to cash crops) would result in shifts in the types of supplies and services and affect the dollar value of farm input purchases.

8.5 ACCESS ROAD IMPACTS

8.5.1 LOSS OF FARMLAND

The small amount of farmland lost (approximately 1 ha) as a result of road realignment at the intersection of Schram Road and Highway 20 would not have a significant effect on adjacent farms. Compensation to owners of this land is provided under the provisions of the Ontario Expropriations Act.

8.5.2 FARM FAMILY/FARM OPERATOR DISRUPTION

Noise and dust effects are expected to be negligible. Should there be a situation where these effects are determined to be significant, the affected party will have recourse to OWMC's Hardship Policy.

8.5.3 FARM PRODUCTIVITY IMPACTS

8.5.3.1 Exposure to Nuisance Effects

Crop and livestock exposure to noise and dust is not expected to have any impact on productivity. Any claims arising against OWMC - should a case of impact arise - would be covered by OWMC's Financial Security and Claims Policy or their Hardship Policy.

8.5.3.2 Interference with Farm Vehicles

A low historical frequency of accident between farm equipment and vehicular traffic has been reported along the access route, but OWMC traffic volumes are such that general farm vehicle interference could in some cases be significant. Measures to increase the safety of farm equipment movements along the access route include upgrading Schram Road and controlling traffic movements through the intersection at Highway 20 and Schram Road. Additional measures to reduce interference include strict regulation of waste haulers and scheduling of off-site haulage of excavation materials in order to avoid peak traffic hours.

Interference problems will likely persist even with these measures, particularly at sites like the constricting railroad overpass on Highway 20. Contacts with the farm community should be established and maintained to monitor the occurrence of farm vehicle problems and to determine if other measures are warranted.

8.5.3.3 Access Road Risk

Although the risk of transportation spills is expected to be low, such incidents could produce short or long-term environmental injury depending on the nature of the spill. Municipal emergency response plans, prepared and implemented with the support of OWMC, should reduce the impact of spills. Compensation for injury should offset agricultural losses incurred by the farm operator. Residual impacts will arise if persistent contaminants make soils unsuitable for production or if spill events induce farm operators to leave the area.

Local farm operators have expressed concern about spills of contaminants even though these are expected to be very infrequent along the access roads. Moreover, measures to control the transport of wastes (see Section 8.2.1) are intended to minimize the incidence of spills. The farm community should be advised of these efforts in order to help dispel unwarranted concerns regarding traffic risk. They should also be fully informed about spills that do occur and about the outcome of such events.

8.6 REGIONAL IMPACTS

Regional impacts pertain largely to concerns about farm productivity impacts, especially in the fruit belt located to the north and east of the preferred site. To the extent that there is a detectable impact, provisions under the Financial Security and Claims Policy will compensate for the loss.

Many of the concerns of farm operators in the region will centre on risk associated with air emissions and truck traffic and therefore will be consistent with concerns of operators who are located in the local community and along the access route. As such, measures to minimizing impacts to regional agriculture parallel those cited in Section 8.4.3 and 8.5.3.3 above.

8.7 SUMMARY

A number of impact management measures have been investigated. These involve mitigation, compensation, monitoring, contingency and communication measures. These various measures have been evaluated in terms of their ability to prevent or alleviate the impacts that are expected to occur as a result of facility development.

Displacement impacts will be largely compensated for under provisions of the Ontario Expropriations Act but there is an unmitigatible loss of farm land. Off-site measures such as windbreaks and drainage improvements could be used to compensate for the loss of farm land. A number of on- and off-site mitigation measures can reduce the level of noise, dust and visual impacts; however cumulative effects are still expected to cause a potentially significant disruption of farm families and farm operators in the direct impact zone. Additional mitigative measures such as relocating the residence on existing farm properties should be considered in such cases.

Those farmers from the DIZ who choose to leave the area because of residual impacts and risk will have recourse to the PVPP or the buy-out policy. Any financial loss caused by property value effects will therefore be fully compensated. A hardship policy and mechanisms for claims against OWMC will be available to offset financial burdens associated with other special cases of unmitigatible impact.

Financial claims mechanisms would also cover agricultural losses should they arise from any productivity effects. Crop and livestock monitoring will provide information to help in evaluating such effects.

Consumer fears of contamination as a cause of declining product sales are probably as likely to affect farm prospects in the local community as are actual problems with productivity. Both are unlikely, but consumer fears may be engendered, in the absence of any real cause, by fear, simply as a result of poor communications between OWMC, local farmers and the general public. Effective communication programs backed by sound crop and livestock monitoring programs in which local people and regulatory agencies are fully involved are the key to minimizing this impact.

Mitigation programs will prevent indirect impacts only to the extent that, by reducing direct effects, they prevent the resulting reactions of affected individuals. Potential indirect impacts include the out-migration of farm operators, the erosion of agricultural community networks, increases in off-farm employment and non-farm in-migration. As a result of such impacts, the community may lose important livestock operations, less land may be available for cropping, crop land rentals may become more prevalent and part-time or hobby farms may replace existing full-time farm operations.

Lands acquired off-site provide OWMC with its greatest opportunity for controlling community effects. These lands can be assembled into larger blocks if possible and sold or rented back to farm operators (preferably local) in order to promote continuing agricultural production. Beyond this, OWMC can lend support to regional or municipal policy initiatives that promote agriculture. It should also use communication and monitoring programs to maintain a dialogue with the farm community and to assess how that community is responding and adjusting to facility impacts.

CHAPTER 9

MONITORING AND CONTINGENCY MEASURE RECOMMENDATIONS

9.1 INTRODUCTION

As noted in Chapters 7 and 8, facility impacts are generally expected to be low and OWMC's proposed impact management programs adequate to mitigate most agricultural impacts. However, there remain areas of uncertainty associated with facility risk and impact prediction and it is these areas for which monitoring and contingency programs need to be established to reduce, where possible, that uncertainty and to signal the need for further mitigation or compensation should unexpected impacts emerge.

9.2 MONITORING

Monitoring of agricultural resources over time serves a number of purposes including:

- early detection of unforeseen problems signaling the need for facility modifications;
- evaluation of the effectiveness of established impact management programs to determine the need to revise these; and
- verification of injurious effects to support fair compensation.

This section recommends that certain monitoring programs be established and provides an accompanying rationale for their inclusion. The recommendations pertain to three areas of monitoring: direct impacts to crops and livestock (biomonitoring); agricultural productivity; and socio-economic change in the agricultural community and economy. Specific details of these monitoring programs will be developed in the upcoming months in discussions between OWMC, local agencies and area residents.

9.2.1 CROP AND LIVESTOCK BIOMONITORING

The risk to crops and livestock related to emissions or spills of contaminants is predicted to be low. However, the need to verify this prediction and to address the concern on the part of many within the region regarding risk of air and water pollution suggests that a high priority be placed on establishing a biomonitoring program.

It is recommended that a network of biomonitoring stations be established in which both naturally occurring and agricultural plant and animal species are regularly observed to detect visible contaminant effects and analysed to determine contaminant levels in tissues.

In the event of spills or upset events it may also be necessary to mount additional biomonitoring efforts within the affected areas. These efforts would provide information in support of compensation negotiations and could help determine the need for remedial efforts for instance to rehabilitate damaged soils.

The information derived from this program will provide evidence of any contaminant effects, verify the prediction of risk to vegetation and provide evidence to address the concerns of residents within the local and regional community.

9.2.2 AGRICULTURAL PRODUCTIVITY MONITORING

Agricultural productivity should be monitored in the local community. Such a program would be related to the biomonitoring program in dealing with impacts on crops and livestock but it should address the broader issue of productivity impacts that could be associated with contaminant emissions or with noise, dust and other effects.

Agricultural productivity would be monitored in part by compiling published agricultural productivity statistics. In addition, selected farms in the local community should be monitored over time to provide data on crop productivity and production of selected livestock/poultry products. Farm records should be reviewed and crops inspected for yield effects. Productivity data may also be available from O.M.A.F., from producer associations and from crop insurance records.

There should be provision made within this monitoring program to follow-up on specific complaints from area producers or to evaluate the impact of extraordinary events such as spills.

By documenting changes over time, this program would serve to address the concerns of farm operators regarding OWMC effects on productivity and farm viability.

9.2.3 SOCIOECONOMIC MONITORING

The areas of uncertainty that suggest the need for a socioeconomic monitoring program include possible out-migration of farm operators, in-migration of non-farm residents, and shifts away from livestock operations. Other possible indirect effects include changes in land values, land tenure, and property size. Changes in the mix of the farm/non-farm population could also affect the composition of, or support for, certain farm organizations. The uncertainty about the farming activity, translates into a similar uncertainty about impacts on agribusiness.

It is therefore recommended that changes in the local farm community be monitored to assess economic and social trends. Potential indicators include land value, land tenure and farm size. These data can be obtained from assessment office files and possibly from selected real estate agents. Memberships within rural/agricultural groups and organizations can be monitored in cooperation with local sponsoring agencies. Agricultural land uses and cropping patterns can be readily surveyed during the growing season each year or every few years. Finally communications with local farmers and farm groups can be used as a more informal means of assessing facility effects on the local farm community.

Economic indicators to be monitored include local and regional crop and livestock activity levels, and the status of agribusiness. Potential data sources include periodic windshield surveys, published statistics from O.M.A.F., and business directories. As part of the monitoring and communication efforts, dialogue could be maintained with agribusiness.

9.3 CONTINGENCY MEASURES

Risks associated with facility emissions and access road spills are forecast to be small but they are not discounted altogether. Contingency measures are therefore required to offset the effects of any accidental releases of contaminants.

Emergency response planning efforts by area municipalities and OWMC will provide the principal vehicle for contingency planning. It is recommended that these plans accommodate the particular concerns of farmers. Within the context of an emergency response, perhaps the most critical requirement for potentially affected farmers will be a speedy warning so that they can move livestock away from downstream areas. Plans should also be in place to assure proper care for livestock in the event of an evacuation. A warning system must take into account the fact that farmers will usually be difficult to reach during the day when they are out of the house.

During emergency conditions, special efforts to safeguard standing crops may not be feasible in light of the need to place priority on human safety. There should, however, be follow-up crop monitoring efforts to evaluate crop damages. Monitoring should commence as soon after an incident as possible and continue over the growing season or until all expectations of damage potential have passed. A multi-year period could be involved if soils are affected. Livestock monitoring may be warranted if feed crops or livestock water supplies are within the impact zone of a spill or release.

If persistent soil or water effects occur, then contingency plans should include provisions for livestock watering and feeding.

9.4 SUMMARY

During the questionnaire survey the farming public did not express confidence in monitoring but monitoring is nevertheless valuable. It will help to verify risk assessment predictions and will provide important data in support of a public information program. Emergency response planning is another integral component of an impact management program to address risk impacts. Over time, of course, nothing will allay fears of contamination more effectively than a substantially incident-free performance record for the facility. Safe operating procedures are therefore as important as any other means of reducing perceptions of risk.

APPENDICES

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APPENDIX A-1

INTERVIEWS WITH FARM OPERATORS IN THE LOCAL COMMUNITY

INTRODUCTION

Outlined in this appendix are details of the data collection procedures employed in the Phase 4B questionnaire survey of farm operators within the local community.

SURVEY OBJECTIVES

The primary objectives of the questionnaire survey of farm operators were:

- To gather detailed information on the farm businesses within the study area for the purposes of predicting impacts (i.e. agricultural production, marketing, revenues and agribusiness activities).

- To compile comprehensive baseline data on the characteristics of the agricultural community that could be used for monitoring changes. This includes farmers' intentions for changes to their operations, and relocation plans with and without the OWMC facility.

- To collect the opinions of farmers regarding the impacts that they expect will occur and how they would respond if they occur.

- To identify the potential impacts of a social nature that would in turn affect the viability of the local agricultural community and economy.

- To obtain the opinion of farmers about the relative merits of different approaches and techniques for mitigation/compensation measures. This information provided the basis for follow-up discussions about specific mitigation/compensation requirements for farms.

- To collect specific information for other consultants such as farm and rental income, farm employment levels and wage rates which could be used to describe the agricultural community's economic base and labour force.

QUESTIONNAIRE DESIGN

The farm survey was designed and undertaken in conjunction with the Social Consultants of the Institute of Environmental Research (IER) who were responsible for the non-farm interviews.

One questionnaire was administered to both farm and non-farm landowners and tenants (see Figure A-1 at the end of this appendix). Questions dealing with farm businesses in Sections B to H were not completed by non-farmers.

Details of the questions dealing with the socio-economic profile of the community are discussed by the Institute of Environmental Research (1987). The remainder of this section documents procedures for carrying out the agricultural work.

It was recognized that the geographic location of farms relative to the boundaries of the local community would include the following situations:

1. farm operations located within the local community farming land both within and outside the local community.

2. farm operations with headquarters located outside the local community farming land within.

Where the first situation occurred, the entire questionnaire was completed. Questions 29 to 44 in Figure A-1 were completed for only those properties located within the local community. Farmers in the second situation completed Sections B to H plus Questions 84 to 92 and 108. Questions 29 to 44 were filled out for farmed properties within the local community.

In addition to the main sections, four addenda were administered.

Addendum 1 was administered to all residents, both farm and non-farm, located along the section of the preferred access route within the local community (see Appendix A-2 for details).

Addendum 2 was administered to those farmers who farm land along the access route and did not return the Phase 4A access route survey (see Appendix A-2 for details).

Addendum 3 - OWMC was evaluating the site entrance options at the time of the survey. Since one of the options is off Schram Road, Addendum 3 was used to determine what use of the road is made by farmers.

Addendum 4 - This was directed to farmers with land adjacent to the preferred site and along the proposed OWMC drainage channel. This was used by the agricultural consultants to determine the potential for effects of any channel improvements on adjacent tile drainage systems.

A covering page provided information on the name, address and telephone number of the respondent, the property assessment roll numbers, lot and concessions, interviewer's name and date, and time of the interview. One final page of the interview form (Appendix 1 of Figure A-1) documented requests for follow-up from the respondent.

A 1:10,000 scale map showing property boundaries, lot and concession and the study area boundary, and a 1:10,000 scale photomosaic flown in April 1986 were used with the questionnaire. The property boundary map was used during the interview to locate farm properties and assessment roll numbers. Farm buildings (Questions 27 and 28b) cropped fields (Question 35) other land uses (Question 36) and tile drainage (Question 44) were marked on the photomosaic map.

PRE-TESTING

A draft questionnaire form was provided to the West Lincoln Toxics Committee (WLTC) for review in May 1986. Preliminary feedback was provided at several meetings between representatives of the WLTC, OWMC, Ecologistics Limited and IER. In early June, the questionnaire was pre-tested with four farmers and two non-farmers. All lived outside the local community and were aware of the proposed facility at the time of the pre-test. An Ecologistics Limited and IER interviewer jointly pre-tested the questionnaire with the farmers.

Following these pre-tests a revised questionnaire form was presented to the WLTC. Comments from the WLTC were subsequently reviewed with OWMC staff, Ecologistics and IER consultants.

PREPARATION OF INTERVIEW MASTER LISTS AND BASE MAPS

Ecologistics Limited was responsible for compiling a list of people to be interviewed and preparing a map showing the property ownership boundaries within the local community.

The Ontario Ministry of Revenue Assessment Roll Office in St. Catharines supplied information on the following:

- the name and address of the legal owner of each property
- the name of the tenant farming the land (where available)
- the property assessment roll numbers

- use of the land (e.g. farmland with a farm residence, farmland with no residence, residential unit)
- the size of the property.

Copies of assessment roll maps (December 30, 1985) covering the primary local community were obtained at a 1:2,000 scale. These maps showing property boundaries and assessment roll numbers were re-drafted on a 1:10,000 scale Ontario Base Map. Each property was assigned its assessment roll number and a symbol(s) representing the Ministry of Revenue land use and tenure status codes. The designations are:

LAND USE

RU - Residential Unit
VL - Vacant Land
FRU - Farm Land with a Farm Residence
FL - Farm Land without a Farm
COM - Commercial
IND - Industrial
VCI - Vacant Commercial or Industrial
OE - Cemeteries or Specified Charities not Associated with a Church
CA - Conservation Authorities
OH - Ontario Hydro
LG - Municipal, Regional or County Government
EDN - Educational
REL - Religious Properties and Cemeteries Associated with a Church
OT - No Specific Code Assigned i.e. boathouses, sheds

TENURE

O - Owner
T - Tenant

The map was field checked in May, 1986 by an Ecologistics Limited and IER consultant. Differences in the codes and observed uses such as vacant or new homes, and idle farmland were checked with the Ministry of Revenue Assessment Office in St. Catharines. Properties coded REL, for example, were visually checked to see whether a residence was also located on the property.

The designations provided by the assessment roll files formed the basis for the identification of farm and non-farm interviews.

Properties with an RU designation - both O and T codes - were identified as potential non-farm interviews. Properties assigned FRU and FL - including both O and T codes - were identified as potential farm interviews. To account for farms with more than one property the names of the legal owner and tenant farming the properties with FL designations were cross-checked with the FRU properties. Double counting of farm operators was thus avoided. Properties with a FL designation that did not match the name of a FRU property were assumed to be farmed by operators with headquarters located outside the local community.

COORDINATION AND SCHEDULING OF INTERVIEWS

The interviews with farmers were undertaken from July 7 to September 16, 1986. The overall coordination, notification and scheduling of interviews was the responsibility of OWMC. An Ecologistics Limited agricultural coordinator, five agricultural interviewers and four social interviewers worked out of the OWMC regional office in Smithville under the direction of an OWMC Co-ordinator. A brief outline of the interviewing process and procedures is described below.

NOTIFICATION

In the last week of June 1986, OWMC mailed a notification letter to all residents within the local community and farmers living outside the local community farming land within. They were advised of the upcoming interviews and were asked to consent to an interview.

Non-resident landowners living outside of the local community were also notified by letter of the survey program and given the opportunity to comment on the OWMC proposal on a short `mail-back´ questionnaire form. Samples of these letters are included as Figures A-2 and A-3.

In the first week of July, OWMC field staff began to telephone residents and farmers to schedule interviews. If they could not be reached following three attempts, a registered letter, advising them that they could not be contacted and asking them to call the Smithville Office, was sent.

In cases where the schedulers could not match a name and address to a property, or find a telephone number, the interviewers checked with the Ministry of Revenue Assessment records for changes, or personally visited the residence on the property and asked the occupant to consent to an interview. When the residents or farmers agreed to an interview, a scheduling sheet was filled out and passed on to the appropriate interviewers who then administered the survey.

If a resident was not at home when the interviewer arrived for a scheduled interview, the interviewer notified the OWMC schedulers, who attempted to reschedule the interview.

Midway through the interviewing schedule, some residents, when contacted for interviews, expressed uncertainty about the purpose and nature of the interviewing process. Consequently, a second letter (Figure A-4) was sent by Ecologistics Limited and IER to all residents and non-resident farmers to explain the purpose of the survey and again invite participation in the survey process.

OWMC

Ontario
Waste Management
Corporation

2 Bloor Street West
11th Floor
Toronto Canada
M4W 3E2
(416) 923-2918

FIGURE A-2

June 27, 1986

Dear

In September 1985, the Ontario Waste Management Corporation identified a preferred site in West Lincoln for an industrial waste treatment and-disposal facility. We are currently examining this site in closer detail prior to presenting our proposed site and facilities to a public hearing under the Environmental Assessment Act of Ontario.

As part of this study, we are conducting a series of interviews with people who live and farm near our proposed site, in order to identify concerns about the proposed facility. This interview will be similar to the "Walk and Talk" survey conducted about two years ago, but will involve residents from a wider area around the site.

The information from this survey will be used to update the information from that earlier survey and will also assist us in determining how the proposed site might affect the community. This information will help us in monitoring the impacts of the proposed facility and in proposing ways in which those impacts might be lessened.

We understand that you own farm property near our proposed site. If you are presently farming the land, we would like the opportunity to sit down with you, to conduct a personal interview at your convenience, in your home. Within the next few weeks, OWMC will telephone you to arrange a convenient meeting time.

If your property is leased, we would like to conduct the personal interview with your tenant, and will not be requesting an interview with you. However, if you have any concerns about our proposed facility, we hope you will contact us to discuss them at our Smithville office at 957-2367.

I thank you in advance for your assistance.

Sincerely,

D.A. Chant
Chairman and President

OWMC

Ontario
Waste Management
Corporation

2 Bloor Street West
11th Floor
Toronto, Canada
M4W 3E2
(416) 923-2918

FIGURE A-3

June 27, 1986

Dear

In September 1985, the Ontario Waste Management Corporation identified a preferred site in West Lincoln for an industrial waste treatment and disposal facility. We are currently examining this site in closer detail prior to presenting our proposed site and facility to a public hearing under the Environmental Assessment Act of Ontario.

As part of this work, we are conducting personal interviews with the people who live and farm near our proposed site to identify their concerns. This information will assist us in determining how the proposed site might affect residents and owners of land in the area. The information will also help us in monitoring the impacts of the proposed facility and in proposing ways in which those impacts might be lessened.

We understand you own land near this site located on Highway 20, 5 km west of Regional Road 20. We wanted you to know that this program is taking place, although at this time, we will not be conducting any personal interviews with non-resident landowners. You may, however, wish to provide us with information about land by returning the attached questionnaire.

If you have any questions or comments, please call our Smithville office at 957-2367.

Sincerely,

Da. Chant

D.A. Chant
Chairman and President

FIGURE A-3 cont'd

QUESTIONNAIRE TO NON-RESIDENT LANDOWNERS

1. How have you used the property you own over the last year?

2. Is your property used by others, and if so, how?

3a) If the OWMC facility is built, do you think the current use of your property would be affected? If yes, please explain how.

3b) Do you have any future plans to change the current use of your property? Do you think these plans would be affected by the proposed OWMC facility, and if so, how?

Please return by August 25, 1986 to:

OWMC Regional Office,
Village Square Mall,
Hwy. 20 and Industrial
Smithville, Ontario
L0R 2A0

FIGURE A-4

ier

81 SHEPPARD AVE. W., SUITE 201, WILLOWDALE (TORONTO), ONTARIO M2N 1M4 • (416) 226-4022

INSTITUTE OF
ENVIRONMENTAL
RESEARCH (1985) INC.

August 22, 1986

Dear

As you know, a questionnaire survey of landowners and tenants has been underway since the beginning of July in the vicinity of the Ontario Waste Management Corporation's proposed site in West Lincoln for an industrial waste treatment facility.

Some residents, when contacted for interviews, expressed uncertainty about who would conduct the interviews and our reasons for collecting the information.

The interviews are being conducted by Ecologistics Limited and the Institute of Environmental Research Inc., agricultural and socio-economic consultants to OWMC. In a letter sent to you on June 27, 1986, the purpose of the interviews was described as assisting in determining how the proposed facility might affect your community. As a landowner or tenant in the vicinity of the preferred site, your information and views are being sought to understand how the proposed facility could affect the use and enjoyment of your property, your farm business, and other activities in your community.

This will provide important information to us in preparing the Environmental Assessment, and will help us to examine the community's needs for monitoring should the OWMC proposal be approved. The questionnaire also provides an opportunity for local residents to identify their present concerns, and to suggest steps which might help to lessen potential impacts.

To those who have completed a questionnaire, we would like to thank you for your assistance. To those who to-date have declined to be interviewed, we encourage you to reconsider and call the OWMC Smithville office (957-2367) to arrange a suitable time for an interview. If you prefer, you can contact the consultants directly to discuss the questionnaire and arrange for an interview. As we hope to complete the survey as soon as possible, we would appreciate hearing within the next few days from any residents who now wish to be interviewed.

Once again, we wish to extend our appreciation to all who have given any of their time to discuss these issues with OWMC.

Pete Homenuck

Peter Homenuck
President
Institute of Environmental
Research
(416) 226-4022

WR Cressman

David Cressman
President
Ecologistics Limited
(519) 886-0520

INTERVIEWING PROCEDURES - FARM INTERVIEWS

The interviewers were equipped with a blank questionnaire, a 1:10,000 scale photomosaic map and a 1:10,000 scale property map for each interview.

The interviewers reviewed the nature and purpose of the interview with the respondent and explained the confidentiality of the interview form. The interviewer verified the name and address of the respondent.

Then the interviewer conducted the interview, recording the responses to each question on the questionnaire form. Where more than one property was farmed by the operator, the interviewer would record information for Sections C, D, E and F on separate sheets for each property. For Sections B, D, and F, areas in crops and other uses were marked on the photomosaic map. The roll number and property boundaries marked on the property map were checked with the respondent.

The location of houses, areas in crops and other uses, and tile drainage (Sections B, D and F) were marked on the photomosaic map. The fields were numbered on the questionnaire and the map.

If applicable, a respondent answered questions in Addendums 1 to 4. Appendix I was completed if the respondent had any additional comments or requests.

Once an interview was completed, the interviewer checked off the properties associated with the interview on a base map located in the field office. Any differences between the survey results and the assessment roll information (e.g. change in ownership, new farm tenant) were conveyed to the agricultural coordinator. Crops, other agricultural land uses and drainage information on the interviewer's working map was transferred to a land use summary base map in the field office. Codes used on the maps are shown below:

MAP CODE	FIELD CROPS
So	Soybeans
Ba	Barley
Oa	Oats
Ww	Winter Wheat
R	Rye
Gc	Grain Corn
Sc	Silage Corn
Sw	Sweet Corn
Bw	Buckwheat
Mg	Mixed Grain
Wb	White Beans
Bdb	Field Beans and Barley
H	Hay
Ha	Alfalfa
Cl	Clover
St	Straw
Fa	Fallow

MAP CODE	SPECIALTY CROPS
Nu	Nursery
Or	Orchard
Mkt	Market Garden
Fl	Flowers
G	Grapes
A1	Idle (less than 5 years)
A2	Idle (5 years or more)
P	Permanent Pasture
W	Swamp/Wetland
F	Upland/Forest
Wd	Managed Woodlot
Pl	Plantation
B	Farm Buildings
C	Commercial
M	Industrial

SURVEY COVERAGE

Before the farm surveys were conducted, 328 potential farm interviews were estimated based on the land use codes and ownership designations assigned to parcels in the Ministry of Revenue Assessment Rolls (see above). This number was derived by summing the number of FRU designations (indicating farm headquarters were located in the local community) with the number of FL´s with names that did not match any of the FRU´s (indicating farm headquarters were located outside the local community).

Ninety-three farmers completed the survey. Seventy-nine of these were headquartered within the local community and 14 lived outside, farming land within.

Since completion of the surveys and compilation of all the data, the final estimated number of farmers headquartered in the local community was 139. This number is based on:

- checks with agricultural marketing boards and the livestock inventory conducted in Phase 4A.
- the windshield survey (see Appendix B), which assessed farming activity based on crops, livestock and the presence and condition of farm buildings for those properties where an interview was not accorded.
- a review of the estimated number by selected local farmers who are knowledgeable of the local agricultural community.

The survey provides 57% coverage of the 139 farmers headquartered within the study area. An accurate count of the number of farm operators living outside the local community who farm land within it is not available. Information on tenants and landowners on such properties is difficult to obtain as changes are not always reported to the Ministry of Revenue.

DATA CODING

When the questionnaire was designed the bottom section of each page of the questionnaire was reserved for coding boxes. Coding of the responses to questions in the agricultural sections, Sections B through H (see Figure A-1) was completed in the field office. Once these sections of the questionnaire were coded, copies of the questionnaires were forwarded to IER in Toronto to code the remaining non-farm sections. IER in turn, forwarded the complete coded questionnaire to Ecologistics Limited for data entry into a computer.

The coding process was guided by codebooks that were compiled by both Ecologistics Limited and IER for their respective sections of the questionnaire. Ongoing updating of the codebooks was required to accommodate any additional new responses to questions.

DATA CHECKS AND EDITING

Checks of the data were conducted at a number of different stages of data base development to ensure data accuracy and consistency. The types of checks conducted included coding checks, survey content checks and data entry checks.

Coding Checks - After the interviewing was completed and all questionnaires were transferred to Ecologistics Limited, a systematic review of the coding was conducted to ensure that the final codes were consistently applied to all questionnaire responses.

Survey Content Checks - Checks were conducted within the agricultural portion of the questionnaire to resolve inconsistencies of information that occasionally appeared in the responses. For example, any obviously large discrepancies reported in Question 45 between acres planted and total yields were resolved by checking the units in which yields were reported, etc. Property acreage reported in Section C was checked against the sum of all land used in Section D.

Data Entry Checks - Standard procedures were followed for transferring the coded questionnaire responses into the computer.

RESULTS

Responses for each question in the survey were compiled. These results were made available to the WLTC, respondents and the general public through OWMC's field office in Smithville. The results of the agricultural questions are on file at Ecologistics Limited and OWMC.

Ecologistics Limited forwarded frequency counts and cross-tabulations to the OWMC consultants who incorporated the results into their own impact analysis work.

INTERVIEW ID NUMBER

FIGURE A-1

OWMC PHASE 4B

INTERVIEW FORM

THE PURPOSE OF THE INTERVIEW

The purpose for this interview is to collect information from residents who live on and in the area of OWMC's preferred site. This information, in combination with other information, will be used to assess the social, agricultural and economic impacts of the OWMC waste treatment facilities.

Date: Time:
Interviewer(s):

Respondent's Name:
Address:

Lot: Concession:
Township:
Telephone:
Assessment Roll Numbers:
On-Site ☐ Adjacent ☐ Vicinity ☐

INTERVIEWER NOTE: Confirm that the individual being interviewed is the same as the respondent noted above.

The respondent should be told that this information will be used in a discreet manner and presented in aggregate form only. OWMC will not volunteer, disclose or attribute information of a personal, confidential or private nature; however, the information might become subject to disclosure if OWMC is so ordered by the hearing officers.

Also, the respondents should be told that we appreciate their cooperation and they need not feel obligated to answer all or any questions.

Name
Add.

Role No.

Zone

Lot ☐☐☐ Conc. ☐☐☐

Twp ☐☐☐☐☐☐☐☐☐☐

Ph. ☐☐☐ ☐☐☐☐

Int'r ☐

INTERVIEW ID NUMBER ______

A. RESIDENCE

1. How many years have you lived at this address?

INTERVIEWER NOTE: Show respondent the card

☐ 1. Less than one year
☐ 2. 1-2 years
☐ 3. 3-5 years
☐ 4. 6-10 years
☐ 5. 11-15 years
☐ 6. 16-20 years
☐ 7. More than 20 years
☐ 8. Always lived here

2. How long have you lived in West Lincoln?

INTERVIEWER NOTE: This question refers to their total lifetime. Show respondent the card.

☐ 1. Less than one year
☐ 2. 1-2 years
☐ 3. 3-5 years
☐ 4. 6-10 years
☐ 5. 11-15 years — Q. 4
☐ 6. 16-20 years
☐ 7. More than 20 years
☐ 8. Always lived in West Lincoln

3. Were you aware that OWMC was considering a site in this area prior to moving here?

YES ☐ 1. NO ☐ 2.

Comments: ______________________________
____
____
____
____

4. Is this dwelling:
☐ 1. owned or being bought by you or a member of this household?
☐ 2. rented (even if no cash rent is paid)?

5. Was this property owned by another member of your family before you moved here?

YES ☐ 1. NO ☐ 2.

If yes, how many years has this property been owned by members of your family? ________ years

---

1 ☐ 2 ☐ 3 ☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ 4 ☐ 5 ☐ ☐☐☐

INTERVIEW ID NUMBER ________

6. Did any of your ancestors live elsewhere in West Lincoln?

YES ☐ 1. NO ☐ 2.

If yes, approximately how many years and generations has your family lived in West Lincoln? ________ years
________ generations

7. Is your house or property used for any business activity including farming?

YES ☐ 1. NO ☐ 2. **Q. 14**

8. Do you own this business?

YES ☐ 1. NO ☐ 2. **Q. 10**

9. If yes, are you the sole owner of this business?

YES ☐ 1. **Q. 11** NO ☐ 2. **Q. 10**

10. Please identify the owner(s) (or other owner(s)) of the business.
Name ____________________
Address ____________________
Telephone: ____________________

11a What type of business?

***INTERVIEWER NOTE:** If respondent uses property for more than one business, note all businesses and ask Question 11b.*

Farm	______ 1.
Agri-Business	
Custom Work	______ 2.
Horse Training	______ 3.
Horse Boarding	______ 4.
Slaughter House	______ 5.
Equipment Sales and Service	______ 6.
Construction	______ 7.
Feed Mill	______ 8.
Other (write in)	
____________	______
____________	______
Other Business	
Real Estate	______ 21.
Antiques	______ 22.
Furniture Manufacturing/Refinishing	______ 23.
Crafts	______ 24.
Insurance	______ 25.
Other (write in)	
____________	______
____________	______

11b. Which is your main business? ____________________

***INTERVIEWER NOTE:** If this is their own business, ask Questions 12 and 13. If not, go to Question 14.*

---

6 ☐ ☐☐☐ ☐☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ 11a ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ 11b ☐☐

INTERVIEW ID NUMBER ______

12. Would you provide us with your estimated annual gross business income? ______

13. Would you provide us with your estimated annual net business income? ______

14. Do you rent your property to others for business activities or farming?

YES ☐ 1. NO ☐ 2. **Q. 17**

15. For what purpose(s) do they use your property? ______

16. Who rents your property?
Name ______
Address ______
Telephone ______

17. Other than people living in this household, do any individuals or groups use this property for any social or recreational activities on a regular basis?

YES ☐ 1. NO ☐ 2.

If yes, for what activities? ______

Who uses your property? General Public (check) ☐

Group ______
Name of contact ______
Address ______
Telephone ______

Group ______
Name of contact ______
Address ______
Telephone ______

Group ______
Name of contact ______
Address ______
Telephone ______

INTERVIEWER NOTE: If respondent's property is farmed, ask Question 18 to 50. If not, go to Section I Question 51.

---

12 ☐☐☐☐☐☐☐ 13 ☐☐☐☐☐☐☐ 14 ☐ 15 ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

16 ☐ ☐

Y/N Type Address

17 ☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐

INTERVIEW ID NUMBER ______

B. GENERAL CHARACTERISTICS OF THE FARM OPERATION

18. Which of the following best describes the type of organization for your farm business?

☐ 1. sole proprietorship (i.e., operated privately by an individual)
☐ 2. partnership among family members primarily (i.e., spouse, brother, parents)
☐ 3. partnership among non-family members primarily
☐ 4. a corporation with most of the shares owned by you and your family (i.e., spouse, brother, parents)
☐ 5. a corporation with most of the shares owned by others
☐ 6. other (please specify type) ______

19a. Who is the principal operator(s) (yourself, spouse, father, etc., who is responsible for day-to-day decisions in the operation)?

1. ______
2. ______

19b. How many weeks of off-farm work were completed in 1985 by the principal operator(s)?

1. ______ weeks
2. ______ weeks

20. Would you describe the farm business as a:

☐ 1. full-time operation
☐ 2. part-time operation
☐ 3. hobby farm
☐ 4. other (write in) ______

21. Starting with the most important, what are the main farming activities taking place in your farm business?

INTERVIEWER NOTE: If more than one, obtain an indication of the relative importance by ranking, starting at 1 - most important.

Cash Crop (specify) ______ ______ 1.
Mixed Crop ______ 2.
Dairy ______ 3.
Poultry ______ 4.
Beef Cow-Calf ______ 5.
Beef Calf to finish ______ 6.
Beef Feedlot ______ 7.
Sow - Farrow to Finish ______ 8.
Sow - Farrow to Weaner ______ 9.
Feeder Hogs ______ 10.
Other (write in)
______ ______
______ ______
______ ______

---

18 ☐ 19a ☐☐ ☐☐ 19b ☐☐ ☐☐ 20 ☐

21 ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

INTERVIEW ID NUMBER ________

22. So that we can identify everyone involved in the farm operation, can you identify those people working on the farm, describe whether they are full-time or part-time, and indicate how many months they work each year.
(Status Code: full-time = 1; part-time = 2)

	Status	Weeks of Employment in 1985
Respondent 1.	____	________
Spouse 2.	____	________
Dependents 3.		
	____	________
	____	________
	____	________
	____	________
Other Family (e.g., brother) 4.	____	________
Other Hired Labour 5.	____	________
	____	________
	____	________

INTERVIEWER NOTE: When calculating total months - 1 month is equivalent to 4 weeks, 1 week is equivalent to 6 days or 48 hours.

23. What was your total wage bill for 1985? $________

24. What properties are you farming? (Give location and assessment roll number.)

Lot a.	Concession b.	Municipality c.	Assessment Roll Number d.
______	______	________	______
______	______	________	______
______	______	________	______
______	______	________	______

25. How much farm and non-farm land is there, in total, in these properties? ________ acres

26. How much of this land:
a. do you own ________ acres
b. do you rent from someone else ________ acres

22

24 a b c d

25

26a

23

b

INTERVIEW ID NUMBER ______

27. Please indicate where your farm headquarters is and mark the location on a map (with an "MH").

a. Assessment Roll Number ______
b. Municipality ______
c. Lot ______
d. Concession ______

28a. Are there any other occupied houses on any of the properties that you farm?

YES ☐ 1. NO ☐ 2.

28b. If yes, mark the location on the map (with an "OH"), give the name of the main occupant, and indicate if he or she is connected to your farm operation (e.g., partner, hired man).

Assessment Roll Number a.	Name b.	Connection to Farm Operation (describe) c.

---

27 (a) ☐☐-☐☐☐-☐☐☐ (b) ☐☐☐ (c) ☐☐☐ (d) ☐☐☐

28a ☐

	(a)	(b)	(c)
28b	☐☐-☐☐☐-☐☐☐	☐☐☐	☐☐
	☐☐-☐☐☐-☐☐☐	☐☐☐	☐☐
	☐☐-☐☐☐-☐☐☐	☐☐☐	☐☐
	☐☐-☐☐☐-☐☐☐	☐☐☐	☐☐
	☐☐-☐☐☐-☐☐☐	☐☐☐	☐☐

INTERVIEW ID NUMBER ______

INTERVIEWER NOTE:* *Fill out Questions 29 to 44 for each property that is farmed.

C. FARM USE OF PROPERTY

29. Assessment Roll Number: __________

30. What is the size of this property? __________ acres

31. Is the property:

Owned by you ☐ 1. **Q. 33**
Rented by you from other(s) ☐ 2. **Q. 32**

32. If rented, who is the registered owner?

a. Name ______________________________
Address ______________________________
Telephone ( ) __________

b. How long have you been renting this property? ________ years

c. What is the term of the lease or rental arrangement? (write in) _____ years

d. What is the total annual cash rent? $ __________

e. Is there a rental arrangement involving crop-sharing or the exchange of farm help? YES ☐ NO ☐

33. Do you rent any of this property to anyone else?

a. YES ☐ NO ☐ **Q. 34**

b. If yes, how many acres? __________

c. Who rents the land?

Name ______________________________
Address ______________________________
Telephone ( ) __________

d. How long have you been renting this property? ______ years

e. What is the term of the lease or rental arrangement? (write in) ________ years

f. What is the total annual cash rent? $ ____________

g. Is there a rental arrangement involving crop-sharing or the exchange of farm help? YES ☐ 1. NO ☐ 2.

---

29 ☐☐-☐☐☐-☐☐☐ 30 ☐☐☐ 31 ☐

32a) ☐ (b) ☐☐ (c) ☐☐ (d) ☐☐☐☐ (e) ☐

33a) ☐ (b) ☐☐☐ (c) ☐ (d) ☐☐ (e) ☐☐ (f) ☐☐☐☐ (g) ☐

INTERVIEW ID NUMBER ______

D. CROPS

INTERVIEWER NOTE: Confirm with the respondent the property location and field layout and then number the fields that are being cropped on the map.

34. Assessment Roll Number: ______________

35. For each field located on this property, please specify the crops grown in 1986, and record the total acreages in the table below.

Field Number a.	Crop (list below) b.	Acres c.
1.	________________	______
2.	________________	______
3.	________________	______
4.	________________	______
5.	________________	______
6.	________________	______
7.	________________	______

36. For the remainder of the property, please mark the following uses on the map using the crop codes and record the total acreages below.

	ACRES a.	MAP CODE b.
idle (less than 5 years)	____	A1
idle (5 years or more)	____	A2
permanent pasture	____	P
swamp/wetland	____	W
upland forest	____	F
farm buildings	____	B
commercial	____	C
industrial	____	M
other (specify)		
________________	____	__
________________	____	__

34	☐	☐	-	☐	☐	☐	-	☐	☐	☐

35

a	b	c
1		
2		
3		
4		
5		
6		
7		

36

a	b

INTERVIEW ID NUMBER _______

E. LIVESTOCK/POULTRY

37. Assessment Roll Number: ____________________

38. Have you, at any time over the last 12 months, had livestock or poultry housed on this property as part of your farm operation?

YES ☐ 1. **Q. 39** NO ☐ 2. **Q. 41**

39. Can you indicate how many of each type of livestock or poultry are currently housed and how many can be housed in total on this property?

Type		Total Number Presently on Property	Capacity of Housing
Dairy Cows	1.	________	
Dairy Cows (less than 1 year)	2.	________	
Replacement Heifers (older than 1 year)	3.	________	________
Beef Cows	4.	________	
Beef Calves (less than 1 year)	5.	________	
Replacement Heifers (older than 1 year)	6.	________	________
Feeder Cattle	7.	________	________
Bulls	8.	________	________
Sows	9.	________	
Boars	10.	________	________
Replacement Gilts (young sows)	11.	________	
Pigs (less than 2 months)	12.	________	
Feeder Pigs (older than 2 months)	13.	________	________
Layer Hens	14.	________	________
Chickens	15.	________	________
Turkeys	16.	________	________
Horses	17.	________	________
Other (specify)		________	________
		________	________
		________	________

40. What is the total value of the livestock kept for breeding purposes on this property? $ ____________________

---

37 ☐☐-☐☐☐-☐☐☐

38 ☐

39

40 ☐☐☐☐☐☐☐

INTERVIEW ID NUMBER ______

INTERVIEWER NOTE: Ask Question 41 if the respondent has chickens, turkeys or dairy cattle.

41. What quota do you have for your operation?

Dairy - liquid 1. ______ litres/day
- industrial 2. ______ litres/day

Eggs 3. ______ number/year

Chicken - broiler, basic 4. ______ kg./year
- broiler, class 2 5. ______ kg./year
- rooster, basic 6. ______ kg./year
- rooster, class 2 7. ______ kg./year

Turkey - broiler, basic 8. ______ kg./year
- broiler, class 2 9. ______ kg./year
- roaster, basic 10. ______ kg./year
- roaster, class 2 11. ______ kg./year

Other (specify)

____________________ ______ ______
____________________ ______ ______
____________________ ______ ______

41

INTERVIEW ID NUMBER ________

F. WATER SUPPLY AND TILE DRAINAGE

42. Assessment Roll Number: ____________

43. What type of water supply do you have for livestock, irrigation and/or household use on this property?

		Livestock a.	Irrigation b.	Household c.
cistern - rain water only	1.	______	______	______
cistern - rain water and purchased water	2.	______	______	______
dug well	3.	______	______	______
drilled well	4.	______	______	______
municipal supply (piped in)	5.	______	______	______
stream	6.	______	______	______
pond	7.	______	______	______

44. Is any of this property tile drained?

YES ☐ 1.　　　NO ☐ 2.

If yes, what are the total number of acres tiled? ________ acres

Please indicate on the map which fields are tile drained using "S" for systematic and "R" for random systems.

---

42 ☐☐-☐☐☐-☐☐☐

43 a ☐ ☐ ☐
b ☐ ☐ ☐
c ☐ ☐ ☐

44 ☐ ☐☐☐

INTERVIEW ID NUMBER ______

G. FARM SALES AND PURCHASES

45. Please describe 1985 crop harvests and sales including all field crops, forages, seed crops, fruits and vegetables.

Crop Type		Acres Planted in 1985	Total Amounts Indicating Bushels, Tons, Tonnes, Bales, etc				Buyer		Buyer Location	
			Harvested	Sold	Fed to Stock					
______	☐☐☐	______	______	______	______	☐☐	______	☐☐☐	______	☐☐
______	☐☐☐	______	______	______	______	☐☐	______	☐☐☐	______	☐☐
______	☐☐☐	______	______	______	______	☐☐	______	☐☐☐	______	☐☐
______	☐☐☐	______	______	______	______	☐☐	______	☐☐☐	______	☐☐
______	☐☐☐	______	______	______	______	☐☐	______	☐☐☐	______	☐☐
______	☐☐☐	______	______	______	______	☐☐	______	☐☐☐	______	☐☐
______	☐☐☐	______	______	______	______	☐☐	______	☐☐☐	______	☐☐
______	☐☐☐	______	______	______	______	☐☐	______	☐☐☐	______	☐☐
______	☐☐☐	______	______	______	______	☐☐	______	☐☐☐	______	☐☐
______	☐☐☐	______	______	______	______	☐☐	______	☐☐☐	______	☐☐

INTERVIEW ID NUMBER ______

46. Could you identify the livestock/poultry which you sold in 1985 and record the following details in the table below:

Type a		Number Sold in 1985 b	Average Live Market Weight c	Buyer d	Buyer Location e
Beef Cattle	1	______	______	______	______
Feeder Steers	2.	______	______	______	______
Feeder Calves	3.	______	______	______	______
Veal Calves	4.	______	______	______	______
Dairy Heifers	5.	______	______	______	______
Hogs	6.	______	______	______	______
Weanling Pigs	7.	______	______	______	______
Sheep	8.	______	______	______	______
Lambs	9.	______	______	______	______
Chickens					
- broilers	10.	______	______	______	______
- roasters	11.	______	______	______	______
Turkeys					
- broilers	12.	______	______	______	______
- roasters	13.	______	______	______	______
Horses	14.	______	______	______	______
Breeding Stock (specify type)					
______		______		______	______
______		______		______	______
______		______		______	______
Other (specify)					
______		______	______	______	______
______		______	______	______	______
______		______	______	______	______
None (check)		______			

46 a b c d e

INTERVIEW ID NUMBER ______

47. Could you identify the livestock/poultry products you sold in 1985 and record the requested details in the table below:

Type a.		Total Amount b.	Unit of Measurement c.	Buyer d.	Buyer Location e.
milk - fluid	1.				
- industrial	2.				
- cream	3.				
eggs	4.				
other (write in)					

None (check) ___

47 a b c d e

INTERVIEW ID NUMBER ______

48. Where do you purchase supplies and services for your farm?

	a.	Supplier Name b.	Location c.
Seed	1.		
Chemicals	2.		
Fertilizer	3.		
Fencing, Twine, etc.	4.		
Feed	5.		
Equipment Sales and Repairs	6.		
Building Repairs	7.		
Trucking	8.		
Custom Work	9.		
Farm Management Services	10.		
Veterinarian	11.		
Other (specify)			

---

48 a b c

INTERVIEW ID NUMBER ______

H. FUTURE FARM PLANS

49. Have you recently considered making any of the following changes in your farm operation? If yes, please describe briefly and explain why?

Check if Applicable	a.	b.
☐	1. Change in crops	
☐	2. Change in livestock	
☐	3. Get more cropland	
☐	4. Cut back on cropland	
☐	5. Invest in: buildings	
☐	6. drainage	
☐	7. equipment	
☐	8. Get out of farming	
☐	9. Move farm operation (where)	
☐	10. Pass operation over to family member within a few years	
☐	11. Other	

50. How has the OWMC announcement affected your farm plans?

______

49a

b

50

INTERVIEW ID NUMBER ______

I. USE AND ENJOYMENT OF PROPERTY

We would like information about how you use your property for social and recreational activities.

51. During previous stages of the site selection process residents living near the proposed hazardous waste management facility sites expressed concern about the possible effects of the OWMC facility. Do you have any concerns if the OWMC facility is built in West Lincoln, and if so, what are your concerns?

YES ☐ 1. NO ☐ 2. DON'T KNOW ☐ 3.

If yes, specify concerns. ______

51 ☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

INTERVIEW ID NUMBER ______

52. Do you or other members of your household currently use your property for any of the following outdoor social and recreational activities?

INTERVIEWER NOTE: Provide card listing activities.

If the OWMC facility is built in West Lincoln, which activities, if any, do you think would be affected and how do you think they would be affected?

INTERVIEWER NOTE: Probe for details on how activities would be affected.

Check Activities Here a.	Would Be Affected b. Yes	No	Don't Know	Effects c.
☐ 1. Swimming	☐	☐	☐	
☐ 2. Gardening	☐	☐	☐	
☐ 3. Entertaining Friends and Relatives	☐	☐	☐	
☐ 4. Snowmobiling	☐	☐	☐	
☐ 5. Cross-Country Skiing	☐	☐	☐	
☐ 6. Family Barbeques	☐	☐	☐	
☐ 7. Children's Activities	☐	☐	☐	
☐ 8. Hunting	☐	☐	☐	
☐ 9. Fishing	☐	☐	☐	
Other (specify)				
☐ ______	☐	☐	☐	
☐ ______	☐	☐	☐	
☐ ______	☐	☐	☐	

52 a b c

INTERVIEW ID NUMBER ________

53. Have you made any improvements to your property since September, 1985?

YES ☐ 1. NO ☐ 2.

If yes, please specify ______________________________

____

____

____

54. Did you have any plans to improve your property that you have put on hold due to OWMC's announcement of its proposed site?

YES ☐ 1. NO ☐ 2.

If yes, please specify. ______________________________

____

____

____

55. Do you have any plans to improve or change how you use your home or property in the future?

YES ☐ 1. NO ☐ 2. **Q. 57**

If yes, specify ______________________________

____

____

____

56. Would the OWMC facility affect these plans in any way?

YES ☐ 1. NO ☐ 2. DON'T KNOW ☐ 3.

If yes, in what way(s)? ______________________________

____

____

____

____

____

	Y/N	Comments
53	☐	☐☐ ☐☐ ☐☐ ☐☐ ☐☐
54	☐	☐☐ ☐☐ ☐☐ ☐☐ ☐☐
55	☐	☐☐ ☐☐ ☐☐ ☐☐ ☐☐
56	☐	☐☐ ☐☐ ☐☐ ☐☐ ☐☐

INTERVIEW ID NUMBER ______

J. SATISFACTION WITH COMMUNITY

The next few questions will provide us with an idea of how satisfied you are with this area as a place to live and what you like and/or dislike about the area. When you respond, we would like you to think about how you felt about this area prior to the announcement of OWMC's preferred site in West Lincoln.

57. Generally, how satisfied were you with this area as a place to live?

INTERVIEWER NOTE: Show respondent the card

Very Dissatisfied				Very Satisfied
1	2	3	4	5

58. What were the three most important characteristics you liked about this area?

____
____
____
____
____
____
____
____

59. On this card are some possible characteristics that may make a community a satisfying place to live. Which of these characteristics, if any, do you like most about this area?

INTERVIEWER NOTE: Show respondent the card and check as many as applicable.

Good place to raise children	☐ a.
Friendly people	☐ b.
Attractive area	☐ c.
Large properties	☐ d.
Open space	☐ e
Peace and quiet	☐ f.
Safety	☐ g.
Pace of life	☐ h.
Values of the community	☐ i.
Accessibility to work, school, etc.	☐ j.
Accessibility to friends	☐ k.
Way of life	☐ l.
Clean air	☐ m.
Traffic	☐ n.
Quality of schools	☐ o.
Cooperation among neighbours	☐ p.
Absence of industrial development	☐ q.

---

57 ☐

58 ☐☐ ☐☐ ☐☐

	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q
59	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

INTERVIEW ID NUMBER ________

60. On this card are some additional characteristics that could sometimes be a problem in a community. Do you find any of these to be a problem in this area?

INTERVIEWER NOTE: Show respondent the card and check as many as applicable.

Accessibility to places you want to go to	☐ 1.
Traffic	☐ 2.
Neighbours	☐ 3.
Lack of upkeep of neighbouring properties	☐ 4.
Odours (e.g., manure application)	☐ 5.
Dust	☐ 6.
Noise	☐ 7.
Water quality	☐ 8.
Lack of political clout	☐ 9.
Lack of population	☐ 10
Other (specify)	
________________________	☐
________________________	☐
________________________	☐

61. The following is a list of services provided in most communities. Please rate the quality of these services in your community in terms of whether they are very good, good, adequate, poor or very poor.

INTERVIEWER NOTE: Show respondent the card

		Very Good 1	Good 2.	Adequate 3.	Poor 4.	Very Poor 5.	Don't Know/ No Opinion 6.
Police Protection	a.	☐	☐	☐	☐	☐	☐
Fire Protection	b.	☐	☐	☐	☐	☐	☐
Quality of Schools	c.	☐	☐	☐	☐	☐	☐
Recreational Facilities and Services	d.	☐	☐	☐	☐	☐	☐
Medical and Health Facilities	e.	☐	☐	☐	☐	☐	☐
Shopping Facilities for Daily Needs	f.	☐	☐	☐	☐	☐	☐
Maintenance of Regional Roads	g.	☐	☐	☐	☐	☐	☐
Maintenance of Township Roads	h.	☐	☐	☐	☐	☐	☐

62. Do you think that OWMC's facility would affect your satisfaction with West Lincoln as a place to live?

YES ☐ 1. NO ☐ 2. DONT KNOW ☐ 3.

If yes, in what way? ______________________________

____

____

____

____

____

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60 ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

61 a☐ b☐ c☐ d☐ e☐ f☐ g☐ h☐

62 Y/N ☐ How ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

INTERVIEW ID NUMBER ______

63. For this question, assume that the OWMC facility will not be built here. If you had to move from this property and were presented with the option of relocating in West Lincoln or elsewhere, would you stay in West Lincoln?

YES ☐ 1. NO ☐ 2. DON'T KNOW ☐ 3.

64. Since OWMC announced its proposed site in West Lincoln, have you considered moving because of the proposed facility?

YES ☐ 1. NO ☐ 2. **Q. 66**

65. Have you taken any steps towards moving such as contacting a real estate agent or putting your property up for sale?

YES ☐ 1. NO ☐ 2.

If yes, what steps have you taken?

66. If OWMC's proposed facility is built here, would you move?

YES ☐ 1. NO ☐ 2. **Q. 68** DON'T KNOW ☐ 3. **Q. 68**

If yes, where would you move? ______

67. If you have considered moving, are there any reasons why you would be reluctant to move or do you foresee any problems that would make it difficult for you to move?

YES ☐ 1. NO ☐ 2. DON'T KNOW ☐ 3.

If yes, please specify. ______

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63 ☐

64 ☐

65 ☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

66 ☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

67 ☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

INTERVIEW ID NUMBER ________

K. COMMUNITY COHESION AND INVOLVEMENT

68. Think of your three closest friends and tell me how many live in West Lincoln.

One ☐ 1. Two ☐ 2. Three ☐ 3. None ☐ 4.

69. Do you have relatives living in West Lincoln other than those in this household?

YES ☐ 1. NO ☐ 2.

70. How often do you entertain neighbours in your home or are entertained by your neighbours in their home?

INTERVIEW NOTE: Show respondent the card

Never	☐ 1.
Once a year	☐ 2.
Four times a year	☐ 3.
Monthly	☐ 4.
Weekly	☐ 5.
Daily	☐ 6.

71. How often do you help any neighbour or ask for help from any neighbour such as borrowing tools or food, watching each other's houses while away, providing rides for each other when car is not working or helping each other in house repairs, farm chores, etc.?

INTERVIEW NOTE: Show respondent the card

	Non-Farm Help a.	Help With Farm Work b.
1. Never	☐	☐
2. Once a year	☐	☐
3. Four times a year	☐	☐
4. Monthly	☐	☐
5. Weekly	☐	☐
6. Daily	☐	☐

68 ☐
69 ☐
70 ☐
71a ☐ b ☐

INTERVIEW ID NUMBER ______

72. Are you or any other members of your household presently active members of community groups or assocations?

INTERVIEWER NOTE: Community groups and associations would include the Women's Institute, 4H Club, sports organizations, church groups, etc.

YES ☐ 1. NO ☐ 2. DON'T KNOW ☐ 3.

If yes, please indicate the names of the groups or associations and indicate whether you or household members are presently on the executive of these groups or associations.

a.	ON EXECUTIVE b. YES 1.	 NO 2.
______	☐	☐
______	☐	☐
______	☐	☐
______	☐	☐
______	☐	☐
______	☐	☐
______	☐	☐
______	☐	☐
______	☐	☐
______	☐	☐

---

72 Y/N ☐

a	b
☐☐	☐
☐☐	☐
☐☐	☐
☐☐	☐
☐☐	☐
☐☐	☐
☐☐	☐
☐☐	☐
☐☐	☐
☐☐	☐

INTERVIEW ID NUMBER ______

L. USE OF LOCAL FACILITIES

73. Do you have any children attending school?

YES ☐ 1. **Q. 74** NO ☐ 2. **Q. 75**

74. Do your children attend any of the following schools? Please indicate the number of children who attended each school in the last school year.

INTERVIEWER NOTE: Show respondent the card.

		Number of Children
Gainsborough Elementary School	a.	______
College Street Elementary School	b.	______
Smithville District Christian High School	c.	______
South Lincoln High School	d.	______
St. Martin's Separate School	e.	______
St. Ann Separate School	f.	______
John Calvin School	g.	______
Wellandport Christian School	h.	______
E.L. Crossley High School	i.	______

75. Do you or other members of your household attend church services?

REGULARLY ☐ 1. OCCASIONALLY ☐ 2. NEVER ☐ 3.

If regularly or occasionally, at which church?

____

---

73 Y/N ☐

74 1 ☐☐ 2 ☐☐ 3 ☐☐ 4 ☐☐ 5 ☐☐ 6 ☐☐ 7 ☐☐ 8 ☐☐ 9 ☐☐

75 Y/N ☐ ☐☐ ☐☐ ☐☐

INTERVIEW ID NUMBER ______

76. Assume that the OWMC facility is built in West Lincoln. Because of the operation of the facility, would you change where you go for activities and services such as shopping, recreation or medical and dental services?

YES ☐ 1. NO ☐ 2. DONT KNOW ☐ 3.

If yes, why? ____________________

____

____

____

____

____

____

INTERVIEWER NOTE: If yes, ask:

Please identify those activities or services for which you would go elsewhere. For each activity or service indicate where you presently go and where you think you would go if OWMC's proposed facility is built.

Activity/Service a.	Presently Go To b.	Would Change to c.

Y/N Why

76 ☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

a		b		c	

INTERVIEW ID NUMBER ______

M. PUBLIC CONCERNS AND EFFECTS ON INDIVIDUALS

77. What was your reaction to the announcement of the preferred OWMC site in West Lincoln?

____

____

____

____

____

____

____

____

____

78. How do you feel about the announcement of the preferred OWMC site in West Lincoln now?

____

____

____

____

____

79. Do you feel that you have had sufficient opportunities to learn about the facility OWMC is proposing to build in West Lincoln?

YES ☐ 1. NO ☐ 2. DON'T KNOW ☐ 3.

80. Do you feel that you have had sufficient opportunities to discuss the proposed OWMC facility with.

		Yes 1.	No 2.	Don't Know 3.
OWMC officials/consultants	a.	☐	☐	☐
West Lincoln politicians	b	☐	☐	☐
Other residents in West Lincoln	c	☐	☐	☐

81. Do you feel that you and other residents in West Lincoln will be able to influence the final decision regarding whether or not the OWMC facility will be built in West Lincoln?

YES ☐ 1. NO ☐ 2. DON'T KNOW ☐ 3.

If no, why do you feel this way? ____

____

____

____

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77 ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

78 ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

79 Y/N ☐ 80a ☐ b ☐ c ☐

81 Y/N ☐ Why ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

INTERVIEW ID NUMBER ________

82. Have you or anyone else in this household been involved in any of the following activities since the announcement of OWMC's proposed site in West Lincoln?

INTERVIEWER NOTE: Show respondent the card and check as many as applicable.

Telephoned/spoken/written to local politicians ☐ 1.
Telephoned/spoken/written to other policitians ☐ 2.
Read OWMC's reports ☐ 3.
Attended a meeting organized by the West Lincoln Task Force Against Toxic Waste ☐ 4.
Attended an OWMC Open House ☐ 5.
Attended a meeting organized by West Lincoln Council Toxic Waste Committee ☐ 6.
Visited OWMC's site office in Smithville ☐ 7.
Researched the topic of hazardous waste disposal ☐ 8.
Prepared handouts/flyers, etc., concerning the OWMC facility ☐ 9.
Attended a Council Meeting where the OWMC facility was discussed ☐ 10.
Other (specify) ________________ ☐
________________ ☐
________________ ☐

No actions taken ☐

83. In the past year do you feel your life has been more stressful than in the previous year?

YES ☐ 1.   NO ☐ 2.   DON'T KNOW ☐ 3.

If yes, to what do you attribute this stress?

INTERVIEWER NOTE: Use the following list for coding purposes only. Do not read out the list.

New baby in family ☐ 1.
Illness in the family ☐ 2.
Change in financial situation ☐ 3.
Moved to a new house ☐ 4.
Death in the family ☐ 5.
Began a new job ☐ 6.
Change in marital status ☐ 7.
Job demands increased ☐ 8.
Unemployment ☐ 9.
Announcement of OWMC's proposed site ☐ 10.
Other (specify) ________________ ☐
________________ ☐
________________ ☐

82 ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

Y/N Type
83 ☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

INTERVIEW ID NUMBER ______

84. Assume that the OWMC facility will be built in West Lincoln. Based on what you currently know about the facility please tell me how much you agree or disagree with each of the following statements.

INTERVIEWER NOTE: Show respondent the card.

		Strongly Disagree 1	Disagree 2	Neither Agree Nor Disagree 3	Agree 4	Strongly Agree 5	Don't Know 6
a)	People will buy crops grown around the site	☐	☐	☐	☐	☐	☐
	Comment						
b)	There is a risk to the health of residents living near the site	☐	☐	☐	☐	☐	☐
	Comment						
c)	There is a risk of a transportation accident involving a spill	☐	☐	☐	☐	☐	☐
	Comment						
d)	There is a potential for ground and surface water contamination	☐	☐	☐	☐	☐	☐
	Comment						
e)	There is a risk of contamination of crops and livestock	☐	☐	☐	☐	☐	☐
	Comment						
f)	OWMC's proposed technology will safely dispose of hazardous waste	☐	☐	☐	☐	☐	☐
	Comment						
g)	The operators of the facility can be relied upon to safely operate it	☐	☐	☐	☐	☐	☐
	Comment						
h)	Monitoring by the community will relieve my concerns about the safety of the facility	☐	☐	☐	☐	☐	☐
	Comment						

84 a☐ ☐☐☐☐ b☐ ☐☐☐☐ c☐ ☐☐☐☐ d☐ ☐☐☐☐

e☐ ☐☐☐☐ f☐ ☐☐☐☐ g☐ ☐☐☐☐ h☐ ☐☐☐☐

85. During previous stages of the site selection process, residents living near the proposed sites expressed concern about the possible effects of the OWMC facility. We would like to find out if you share these concerns. Based on what you currently know about the facility, would you indicate whether you think your household would be affected:

INTERVIEWER NOTE: Show respondent the card.

		Yes 1.	No 2.	Don't Know 3.
a.	**Noise from facility operations**	☐	☐	☐
	changes to household **changes to farm**			
b.	**Odours from facility operations**	☐	☐	☐
	changes to household **changes to farm**			
c.	**Dust from landfill operations**	☐	☐	☐
	changes to household **changes to farm**			
d.	**Use of outdoor lights on-site all night**	☐	☐	☐
	changes to household **changes to farm**			
e.	**Facility truck traffic on Vineland Road and Highway 20**	☐	☐	☐
	changes to household **changes to farm**			
f.	**Being able to see an industrial facility**	☐	☐	☐
	changes to household **changes to farm**			
g.	**air and water pollution**	☐	☐	☐
	changes to household **changes to farm**			

For each of the events that you think will affect your household, please describe how such a change would cause you to change your household [and farming] activities.

INTERVIEWER NOTE: For each of the events noted as potentially affecting the household, use the space provided to note the changes.

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85 a☐ ☐☐ ☐☐ b☐ ☐☐ ☐☐ c☐ ☐☐ ☐☐ d☐ ☐☐ ☐☐

e☐ ☐☐ ☐☐ f☐ ☐☐ ☐☐ g☐ ☐☐ ☐☐

INTERVIEW ID NUMBER ________

86. Do you think your property value would change if the facility is built?

YES ☐ 1. NO ☐ 2. DON'T KNOW ☐ 3.

If yes, do you think it will increase or decrease?

Increase ☐ 1 Decrease ☐ 2. Don't Know ☐ 3.

87. How would a change in property value affect you?

88. Of the following potential effects, please indicate whether you think each will or will not occur. ***(INTERVIEWER NOTE: If respondent feels the impact will occur, ask:)***
How much of a benefit or detriment do you think each impact is likely to be for West Lincoln residents?
INTERVIEWER NOTE: Show respondent the card.

	Will Occur	Will Not Occur	Don't Know	Very Detrimental		Neither Beneficial Nor Detrimental	Very Beneficial	
a	1	2	3	b. 1	2	3	4	5
a. Local residents leaving the Township	☐	☐	☐	☐	☐	☐	☐	☐
Comments								
b. New jobs for Township residents	☐	☐	☐	☐	☐	☐	☐	☐
Comments								
c. Additional tax revenues for the Township	☐	☐	☐	☐	☐	☐	☐	☐
Comments								
d. OWMC employees and their families moving to the Township	☐	☐	☐	☐	☐	☐	☐	☐
Comments								
e. New industry attracted to the Township	☐	☐	☐	☐	☐	☐	☐	☐
Comments								

86 ☐ ☐ 87 ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

88a ☐ ☐ ☐☐ ☐☐ ☐☐ b ☐☐ ☐☐ ☐☐ ☐☐ c ☐ ☐ ☐☐ ☐☐ ☐☐

d ☐ ☐ ☐☐ ☐☐ ☐☐ e ☐☐ ☐☐ ☐☐ ☐☐

INTERVIEW ID NUMBER ______

89. There may be other effects not mentioned above that are of concern to you. If there are, would you describe them and indicate how they would affect you.

90. Please indicate how important you feel each of the following steps is to protect the interests of residents in West Lincoln if the OWMC facility is built here.

		Not Important				Very Important	Don't Know
		1	2	3	4	5	6
a.	Community monitoring of public health	☐	☐	☐	☐	☐	☐
b.	Regular public reports on facility operations	☐	☐	☐	☐	☐	☐
c.	Compensation for direct costs and damages	☐	☐	☐	☐	☐	☐
d.	Monitoring of air and water quality	☐	☐	☐	☐	☐	☐
e.	Compensation for municipal costs	☐	☐	☐	☐	☐	☐
f.	Monitoring of on-site operations	☐	☐	☐	☐	☐	☐
g.	Improvements in local fire protection and emergency services	☐	☐	☐	☐	☐	☐
h.	Compensation for loss of land values	☐	☐	☐	☐	☐	☐
i.	Monitoring of contaminants in soils, crops and livestock	☐	☐	☐	☐	☐	☐
j.	Local residents represented on a Committee to monitor operations	☐	☐	☐	☐	☐	☐
k.	Monitoring of economic factors (e.g., land values, farm sales, etc.)	☐	☐	☐	☐	☐	☐

89 ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

	a	b	c	d	e	f	g	h	i	j	k
90	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

INTERVIEW ID NUMBER ______

91. Other than these steps is there anything else that OWMC should consider doing to protect the interests of local residents?

92 Of all the steps you've mentioned in Questions 90 and 91, what do you feel are the three most important steps that OWMC can take to protect the interests of residents in West Lincoln?

91 ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

92 ☐☐ ☐☐ ☐☐

INTERVIEW ID NUMBER ________

N. INFORMATION CONCERNING THE OWMC FACILITY

93. In general, from where do you get most of your information about the proposed OWMC facility and the site selection process?

INTERVIEWER NOTE: Show respondent the card. Check as many as applicable.

Newspapers	☐ 1.
TV/Radio	☐ 2.
Neighbours	☐ 3.
School Discussions	☐ 4.
West Lincoln Task Force Against Toxic Waste	☐ 5.
West Lincoln Council Municipal Representative	☐ 6.
West Lincoln Council Toxic Waste Committee	☐ 7.
OWMC Open Houses/Meetings	☐ 8.
OWMC Reports/Press Releases	☐ 9.
OWMC Site Office in Smithville	☐ 10.
Statements of Public Officials	☐ 11.
Other (specify) ______________	☐ 12.
______________	☐ 13.
______________	☐ 14.

94. Have you received any information directly from OWMC concerning the proposed facility or the reasons for selecting a site in West Lincoln?

YES ☐ 1. NO ☐ 2. **Q. 96** DON'T KNOW ☐ 3.

95. Did this information help you to understand:

		Yes 1.	No 2.	Don't Know 3.
the facility proposed by OWMC?	a.	☐	☐	☐
the reasons why a site was selected in West Lincoln?	b.	☐	☐	☐

If no to either of the above, why wasn't the information useful?

____
____
____
____

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93 ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

94 ☐

95 a ☐ b ☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

INTERVIEW ID NUMBER ______

96. Is there any information you would like OWMC to provide ?

YES ☐ 1. NO ☐ 2. DON'T KNOW ☐ 3.

If yes, what information do you require? ______

97. Can you suggest ways in which OWMC could improve the information it provides to you?

YES ☐ 1. NO ☐ 2. DON'T KNOW ☐ 3.

If yes, how could improvements be made? ______

Y/N Type

96 ☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

97 ☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

INTERVIEW ID NUMBER ______

D. HOUSEHOLD CHARACTERISTICS

98. How many adults 18 years of age or over are living in this household? ______

99. How many were born in West Lincoln? ______

100 How many children under 18 years of age are living in this household? ______

101. How many were born in West Lincoln? ______

102. To which age group does each member of your household belong?

INTERVIEWER NOTE: Show respondent the card.

	Age Group
Person a (respondent)	______
Person b	______
Person c	______
Person d	______
Person e	______
Person f	______
Person g	______
Person h	______

103. Using the categories on this card, please indicate the category that best describes the level of education of each household member 18 years of age or over.

INTERVIEWER NOTE: Give card to respondent

		Person a (respondent)	Person b	Person c	Person d	Person e	Person f
Some elementary	1.	☐	☐	☐	☐	☐	☐
Elementary	2.	☐	☐	☐	☐	☐	☐
Some high school	3.	☐	☐	☐	☐	☐	☐
High school	4.	☐	☐	☐	☐	☐	☐
Some university	5.	☐	☐	☐	☐	☐	☐
University degree	6.	☐	☐	☐	☐	☐	☐
Some community college	7.	☐	☐	☐	☐	☐	☐
Community college degree or diploma	8.	☐	☐	☐	☐	☐	☐

---

98 ☐☐ 99 ☐☐ 100 ☐☐ 101 ☐☐

	a	b	c	d	e	f	g	h
102	☐	☐	☐	☐	☐	☐	☐	☐
103	☐	☐	☐	☐	☐	☐	☐	☐

104. We would like some information concerning the occupation and piece of employment of the people living in this household. Please answer the following questions for each person living in this household who is of working age.

INTERVIEWER NOTE: Person A is the respondent

INTERVIEWER NOTE: If someone lives in the household part-time, such as a university student living away from home, exclude them from this question. We are specifically concerned with those who are "full-time" residents of the household. If a person has more than one occupation, list each occupation in the space provided. If one occupation is the person's major occupation, identify it with an asterisk (*). If the person is unemployed, indicate this beside their occupation.

	What is the person's relationship to you? a.	What is the person's occupation(s)? b.	In which municipality do they work? **(INTERVIEWER NOTE:** ***We are only concerned with the municipality (city/town/township) where the person works.)*** c.
Person A (respondent)	Not applicable	______	______
Person B	______	______	______
Person C	______	______	______
Person D	______	______	______
Person E	______	______	______
Person F	______	______	______

104	a	b	c
A			
B			
C			
D			
E			
F			

INTERVIEW ID NUMBER ______

INTERVIEW ID NUMBER ______

105. To which ethnic or cultural group do you belong?

INTERVIEWER NOTE: Give card to the respondent

English	☐ 1.
Scottish	☐ 2.
Irish	☐ 3.
French	☐ 4.
Dutch	☐ 5.
Greek	☐ 6.
Italian	☐ 7.
German	☐ 8.
Scandinavian	☐ 9.
Ukranian	☐ 10.
Polish	☐ 11.
Native Indian or Metis	☐ 12.
Other (specify) ______	☐

106. Using the categories on this card, please indicate the category that best describes the total yearly income for your household.

INTERVIEWER NOTE: Give card to respondent

Under $10,000	☐ 1.
$10,000-$14,999	☐ 2.
$15,000-$19,999	☐ 3.
$20,000-$24,999	☐ 4.
$25,000-$29,999	☐ 5.
$30,000-$39,999	☐ 6.
$40,000-$49,999	☐ 7.
$50,000 and over	☐ 8.
Don't Know	☐ 9.

107. Do you rent a portion of this dwelling or any other dwelling on this property to anyone else?

YES ☐ 1. NO ☐ 2.

If yes, please identify the person(s) to whom you rent:

Name: ______
Address: ______
Telephone: ______

---

105 ☐☐☐☐☐☐
106 ☐
107 ☐

INTERVIEW ID NUMBER ______

108. Do you have any other comments?

INTERVIEWER NOTE: Use this space to record comments.

---

108 ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

APPENDIX I

INTERVIEW ID NUMBER ______

FOLLOW-UP FORM: 4B INTERVIEW

INDIVIDUAL INTERVIEWED

Name: ______________________

Address: ______________________

____

Telephone #: ______________________

Interview ID #: ______________________

COMMENT/REQUEST/ACTION TO BE FOLLOWED UP

____

____

____

____

____

____

____

____

ACTION REQUIRED

☐ OWMC: ______________________

____

☐ IER: ______________________

____

☐ Ecologistics: ______________________

____

FOR INFORMATION OF

☐ OWMC

☐ IER

☐ ECOLOGISTICS

☐ OTHER ______________________

DATE: ______________________

INTERVIEWER: ______________________

FIELD OFFICE CO-ORDINATOR: ______________________

ADDENDUM I
RESIDENTS ON ACCESS ROADS

***INTERVIEWER NOTE:** These questions are only to be asked if the property on which the respondent resides abuts Highway 20 or Regional Road 24.*

The designated truck route for deliveries to the facility will be from the Q.E.W., along Regional Road 24 through Vineland and west on Highway 20 to the site. The OWMC facility will result in the addition of approximately 20 trucks per hour during normal working hours Monday to Friday. The trucks will be delivering hazardous waste or materials that will be used in the treatment of the waste.

The following questions are to assist us in evaluating the effects of the resulting increased truck traffic on Regional Road 24 and Highway 20.

1. Do you have any concerns with the current traffic movement that passes by your house?

   YES ☐ 1. NO ☐ 2.

2. If yes, what are your concerns?

3. Do you have any concerns about the truck traffic that would be added as a result of the OWMC facility?

   YES ☐ 1. NO ☐ 2.

   If yes, what are your concerns?

---

1. ☐ 2. ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

3. ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

4. Do you or other members of your household currently use the roadway shoulder for any of the following activities?

INTERVIEWER NOTE: Show respondent the card.

	Check if yes
Bicycle riding	☐ 1.
Walking for pleasure	☐ 2.
Walking to a friend's house	☐ 3.
Horseback riding	☐ 4.
Snowmobiling	☐ 5.
Walking to shopping	☐ 6.
Walking to school	☐ 7.
Waiting for school bus	☐ 8.
Other (please specify) ______________________	☐

5. Would the additional OWMC related truck traffic affect your use of the roadway area for any of the above activities?

YES ☐ 1. NO ☐ 2.

If yes, which activities and how would they be affected?

Activity a.	Effect b.
______________	______________________________
______________	______________________________
______________	______________________________
______________	______________________________
______________	______________________________
______________	______________________________

6. If the OWMC facility is built in West Lincoln, what could OWMC do to help deal with your concerns about traffic?

____

____

____

____

____

____

____

____

____

____

---

4. ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

5. ☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

6. a b

INTERVIEW ID NUMBER ______

ADDENDUM 2 - FARMS ON ACCESS ROADS

INTERVIEWER NOTE: These questions are only to be asked if the respondent farms properties which abut sections of the OWMC preferred access route and did not return the Phase 4A access road survey.

1. Assessment Roll Number: farm headquarters ______
property(ies) on access road ______

2. Do you move farm equipment on Highway 20? YES ☐ NO ☐
on Regional Road 24? YES ☐ NO ☐

3. If yes, we would like you to think of each time you travel on the road(s) with farm machinery. First of all, on the chart below, identify the different machines and equipment that you move on or across the road. Then, estimate the mileage per round trip and the number of trips. Indicate if the trips are made on a year-round or seasonal basis.

Description of Farm Machine & Equipment	Distance Travelled Per Round Trip (miles)	Number of Times (choose one from below)			Year Round (check)	Seasonal (number of months)
		Year	Month	Week		

INTERVIEWER NOTE: Note: When calculating total months, 1 month equals 4 weeks

INTERVIEW ID NUMBER ______

4. Could you indicate the type and number of times vehicle traffic turn in and out of your laneway on a regular basis and whether they are made on a yearly or seasonal basis.

	Number Per Month	OR	Per Year	Year Round (check)	Seasonal (number of months)
milk truck	____		____	____	____
feed truck	____		____	____	____
livestock truck	____		____	____	____
customers for:					
fruit/vegetable stand	____		____	____	____
"pick your own"	____		____	____	____
other (specify)					
______________	____		____	____	____
______________	____		____	____	____

none (check) ____

5. Do you need to move livestock across the road? YES ☐ NO ☐

If yes, what are the number of crossings per year ______ or month ______? (Choose one)

INTERVIEW ID NUMBER ________

ADDENDUM 3 - FARM USE OF SCHRAM ROAD

INTERVIEWER NOTE: ***These questions are only to be asked if the respondent uses Schram Road to travel between farmed properties.***

1. Assessment Roll Number: farm headquarters ____________________
property(ies) near Schram Road ____________________
____

2. Do you move farm equipment on Schram Road? YES ☐ NO ☐

3. If yes, we would like you to think of each time you travel on the road(s) with farm machinery. First of all on the chart below, identify the different machines and equipment that you move on or across the road. Then, estimate the mileage per round trip and the number of trips. Indicate if the trips are made on a year-round or seasonal basis.

Description of Farm Machine & Equipment	Distance Travelled Per Round Trip (miles)	Number of Times (choose one from below)			Year Round (check)	Seasonal (number of months)
		Year	Month	Year		

INTERVIEWER NOTE: ***When calculating total months, 1 month equals 4 weeks***

4. Do you need to move livestock on or across Schram Road?

YES ☐ NO ☐

If yes, what are the number of crossings: (choose one)
per year ______________ or per month ______________

INTERVIEW ID NUMBER ______

ADDENDUM 4 - FARMS NEAR THE OWMC DRAINAGE CHANNEL

***INTERVIEWER NOTE:** Ask these questions of farmers with properties adjacent to the OWMC site or the site drainage channel.*

1. Do you have any problems with drainage on the property?

   0. No ☐
   1. Spring flooding along drains ☐
   2. Depressional areas poorly drained ☐
   3. Soils generally dry too slowly ☐
   4. No outlet ☐
   5. Other (describe) ☐

   ____

   ____

   ____

   If yes, please mark the problem areas on the map with an "X".

2. Are there any problems with the drain outlets?

   0. No ☐
   1. Flooding ☐
   2. Erosion/Wash Out ☐
   3. Get covered with sediment ☐
   4. Other (describe) ☐

   ____

   ____

   ____

APPENDIX A-2

INTERVIEWS WITH FARM OPERATORS ALONG THE PREFERRED ACCESS ROUTE

INTRODUCTION

This section describes the data collection procedures undertaken for the Phase 4B analysis of the preferred access route. The data collection involved personal interviews with farm operators of properties which abut the section of the preferred access route within the local community and "drop-off" surveys for the section from the boundary of the local community to the QEW.

The work was undertaken in two stages. Stage 1 occurred in July and August, 1986 in conjunction with the interviews with farm operators in the local community. Stage 2 was a separate survey conducted in the end of August for farm operators located along the preferred access route outside the local community. The survey procedures for farmed properties are described in the remainder of this Appendix. The data compilation procedures are described in Appendix D.

STAGE 1: ACCESS ROUTE INTERVIEWS WITHIN THE LOCAL COMMUNITY

QUESTIONNAIRE DESIGN

Two addenda (see Figure A-1) designed to collect information specific to those farm operations located along the access route (Highway 20 and Regional Road 24) were attached to the Phase 4B questionnaire survey forms of the relevant operators.

The questions in Addendum 1 were asked only of those operators whose farm headquarters abut the preferred access route. Those questions identified general concerns related to existing traffic movement, additional traffic movement caused by OWMC, use of the road shoulder and how OWMC-related traffic would affect those uses.

Addendum 2 was designed to obtain specific information from farm operators who had not completed the access route surveys in Phase 4A of 1984. This information included farm machinery movements, service vehicle and customer stops, and movement of livestock across the road.

INTERVIEW PROCEDURE

The farm operators who had not provided access road information were identified prior to their interview on the basis of the Phase 4A survey results and the assessment roll information.

At the interview, farmers were requested to fill out Addendum 2. Other farmers who indicated that they use Highway 20 or Regional Road 24 for farm-related activities were also asked to complete Addendum 2.

RESPONSE RATE

The farm operators with headquarters which abut the preferred access route within the local community who had not completed the Phase 4A questionnaire, provided Phase 4B information.

There are a number of farmed parcels without farm headquarters abutting Highway 20 and Regional Road 24 within the local community. Most of these are farmed by respondents located within the local community. Information about those five parcels not covered in the Phase 4A survey was obtained in Phase 4B.

DATA COLLECTION ALONG THE ACCESS ROUTE OUTSIDE THE LOCAL COMMUNITY

QUESTIONNAIRE DESIGN

A somewhat different set of procedures was used in obtaining information from farm operators located along the preferred access route (Regional Road 24) outside the local community.

A separate self-administered questionnaire was designed by IER and Ecologistics Limited which focused on questions specific to residents' concerns with existing and projected traffic volumes if a waste treatment facility was built. A short 'Business Survey' and 'Farm Survey' were attached and completed by respondents operating businesses and farms.

In addition, a separate addendum was attached to those farm operator surveys who had not filled out a Phase 4A access route survey. This addendum requested information on specific farming activities, type and number of livestock, farm machinery movements, service vehicle stops whether or not livestock were moved across the access road, and the source of the farm water supply. A copy of the complete questionnaire form is included in Figure A-5 at the end of this Appendix.

CO-ORDINATION AND SCHEDULING

The data were collected during August, 1986. The work was carried out from the OWMC field office in Smithville under the direction of IER.

During the week of August 7, 1986, OWMC sent a letter (Figure A-6) to all residents with property abutting the section of the preferred access route (Regional Road 24) outside the local community. A week later IER dropped off the questionnaires to all residences except those that Ecologistics Limited had identified as requiring Addendum 1 requesting farm machinery and service vehicle information. Ecologistics Limited

OWMC

**Ontario
Waste Management
Corporation**

2 Bloor Street West
11th Floor
Toronto, Canada
M4W 3E2
(416) 923-2918

FIGURE A-6

August 7, 1986

Dear

In September 1985, the Ontario Waste Management Corporation identified a preferred site in West Lincoln for an industrial waste treatment and disposal facility. We are currently examining the site in even closer detail prior to presenting our proposed site and facilities to a public hearing under the Environmental Assessment Act of Ontario.

I am writing to request your assistance in an important part of this work - the gathering of information from people such as yourself who live along the access route to our proposed site. We are conducting an access route survey which will focus on traffic-related concerns you may have. In the next few days, representatives from our consultants, the Institute of Environmental Research (IER) and Ecologistics, will be dropping off to you a short, self-administered questionnaire. This questionnaire will provide information about your views on the existing traffic and road conditions, as well as any concerns you may have about OWMC-related traffic should the facility be approved in West Lincoln.

The information gathered from this survey will be combined with other data and used to assess the social and agricultural impacts associated with the OWMC facility. The information you provide will also help us in monitoring the impacts of the proposed facility and in proposing ways which those impacts might be lessened.

Should you have any immediate questions about the survey, please call our Smithville office at 957-2367. I would like to thank you in advance for your assistance.

Sincerely,

Da. Chant

D.A. Chant,
Chairman and President

staff dropped off the forms to these households. There were several farmed properties requiring Addendum 1 with more than one residence on them. Ecologistics Limited interviewers determined at the time of the drop-offs whether the residence was farm or non-farm and left the appropriate sections of the questionnaire.

A covering letter asked respondents to fill out the questionnaire form and advised them that an interviewer would return in several days to pick it up. If the resident was at home when the questionnaire form was delivered, the interviewer arranged a date and time to pick up the completed form. Otherwise, the Ecologistics Limited interviewers returned to the farm residences between August 18 and 22, reviewed the completed form with the respondent, or arranged a time when they could return to pick it up. If a respondent could not be contacted after two call-backs, the interviewer left a letter requesting that the interview form be completed and mailed to IER in the attached stamped, self-addressed envelope.

If during a call-back it was discovered that the respondent was a non-farm resident, the questionnaire was collected and forwarded to IER.

The Ministry of Revenue Assessment Roll information indicated that there were 13 farmed properties without headquarters abutting the preferred access route outside the local community. For 12 of the 13 properties, the interviewers had to find out who was farming them. During the drop-offs and call-backs, the interviewers asked the respondents if they knew who was farming these particular properties. Once known, arrangements were made with these operators to complete the surveys. Four of these 13 properties were found to be idle farmland. Eleven farm respondents out of a potential 20 completed Addendum 1.

Two hundred and five non-farm and 32 farm questionnaires were delivered to residents along the access road. One hundred and twenty-eight of the non-farm residents completed the questionnaire for a response rate of 62 percent. Eighteen of the 41 farm operators (including nine non-resident operators farming parcels abutting the access road) completed the questionnaire for a response rate of 44 percent.

Completed questionnaires were forwarded to IER from the OWMC Smithville office where they were coded, with the exception of the `Farm Survey´ section. This section was coded by the agricultural coordinator at Ecologistics Limited, once the questionnaires were received from IER. Results from Addendum 1 were summarized manually and added to the data obtained during Phase 4A. Otherwise, all coded data were entered into the computer following standard procedures for data entry and checking.

RESULTS

The data from the responses for the access route surveys were provided to the public and WLTC through the Smithville office.

FIGURE A-5

PHASE 4B: SOCIO-ECONOMIC IMPACT ASSESSMENT

ACCESS ROUTE SURVEY

Prepared by:

INSTITUTE OF ENVIRONMENTAL RESEARCH (1985) INC
81 Sheppard Avenue West, Suite 201
Willowdale, Ontario M2N 1M4

and

ECOLOGISTICS LIMITED
50 Westmount Road North, Suite 225
Waterloo, Ontario N2L 2R5

August 12, 1986

INTERVIEW ID NUMBER _____

OWMC PHASE 4B
DROP-OFF QUESTIONNAIRE

Questionnaire Instructions

1. Please do not write in the coding bar section at the bottom of each page as this section is for office use only.
2. The respondent must be 18 years of age or older.

Your Name: ________________________________

Address: ________________________________

____

Telephone No: ____________________

FOR OFFICE USE ONLY

ID#
NAME
ADDRESS

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

LOT ☐☐☐ CONC. ☐☐☐

TWP ☐☐☐☐☐☐☐☐☐☐

PHONE ☐☐☐-☐☐☐☐

ROLL#
☐☐-☐☐☐☐☐☐☐
☐☐-☐☐☐☐☐☐☐
☐☐-☐☐☐☐☐☐☐
☐☐-☐☐☐☐☐☐☐

INTERVIEW ID NUMBER ______

ACCESS ROUTE SURVEY

The Ontario Waste Management Corporation (OWMC) has proposed a site on Highway 20 in West Lincoln for its industrial and hazardous waste management facility. The designated truck route for deliveries to the facility would be from the QEW, along Regional Road 24 through Vineland and west on Highway 20 to the Schram Road sites. The OWMC trucks would carry hazardous waste and other non-hazardous materials used in the waste treatment process.

The following questions are to assist us in evaluating the effects of the resulting increased truck traffic on Regional Road 24 and Highway 20.

1. During earlier phases of the study process, concerns were expressed by residents living along the access route about **EXISTING** traffic conditions on Regional Road 24.

   Below is a list of concerns about the **EXISTING** traffic movement and road conditions along Regional Road 24. From this list, please indicate how important each of these concerns is to you.

	Very Important Concern 1	Important Concern 2	Minor Concern 3	Not a Concern 4
1. Trucks exceeding speed limit	☐	☐	☐	☐
2. Cars exceeding speed limit	☐	☐	☐	☐
3. Conflicts between farm machinery and other vehicles	☐	☐	☐	☐
4. Safety of farm animals crossing the road	☐	☐	☐	☐
5. Safety of cyclists	☐	☐	☐	☐
6. Conflicts between school buses and other vehicles	☐	☐	☐	☐
7. Safety of pedestrians using the shoulder of the road	☐	☐	☐	☐
8. Dust from traffic	☐	☐	☐	☐
9. Noise from traffic	☐	☐	☐	☐
10. Structural damage due to truck vibrations	☐	☐	☐	☐
11. Lack of pedestrian crossings	☐	☐	☐	☐
12. Poorly marked pedestrian crossings	☐	☐	☐	☐
13. Speed limit too high	☐	☐	☐	☐
14. Difficult access to private driveways because of traffic	☐	☐	☐	☐
15. Inadequate road maintenance	☐	☐	☐	☐
16. Truck accidents resulting in spills	☐	☐	☐	☐
17. Icy road conditions	☐	☐	☐	☐
Other (please specify)				
______	☐	☐	☐	☐
______	☐	☐	☐	☐
______	☐	☐	☐	☐

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22

INTERVIEW ID NUMBER ______

2a. The proposed OWMC facility in West Lincoln would result in the addition of approximately twenty trucks per hour on Regional Road 24, during normal working hours, Monday to Friday. Thus, OWMC's truck traffic would represent an estimated 5% increase in the existing daytime hourly traffic volume on Regional Road 24.

Given this potential increase in traffic on Regional Road 24, please indicate how important each of the following concerns is to you.

	Very Important Concern 1	Important Concern 2	Minor Concern 3	Not a Concern 4
1. Possible increase in number of traffic accidents	☐	☐	☐	☐
2. Conflicts with farm machinery	☐	☐	☐	☐
3. Safety of farm animals crossing the road	☐	☐	☐	☐
4. Safety of cyclists	☐	☐	☐	☐
5. Safety of pedestrians crossing the road	☐	☐	☐	☐
6. Conflicts between school buses and other vehicles	☐	☐	☐	☐
7. Dust from traffic	☐	☐	☐	☐
8. Noise from traffic	☐	☐	☐	☐
9. Structural damage due to truck vibrations	☐	☐	☐	☐
10. Safety of pedestrians using the shoulder of the road	☐	☐	☐	☐
11. Truck accidents resulting in hazardous waste spills	☐	☐	☐	☐
12. Adequacy of emergency response to spills	☐	☐	☐	☐
13. Trucks exceeding speed limit	☐	☐	☐	☐
Other (please specify)				
______________	☐	☐	☐	☐
______________	☐	☐	☐	☐
______________	☐	☐	☐	☐

2b. If you would like to elaborate on any of these concerns, please use the space provided below.

____
____
____
____
____
____
____
____
____
____

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
12a																		

2b ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

INTERVIEW ID NUMBER ______

3a. Do you or other members of your household use the roadway area (sidewalk, shoulder, roadway) for any of the following activities?

Walking for pleasure ☐ 1.
Walking to a friend's house ☐ 2.
Horseback riding ☐ 3.
Jogging ☐ 4.
Snowmobiling ☐ 5.
Walking to shopping ☐ 6.
Walking to school ☐ 7.
Bicycle riding ☐ 8.
Waiting for school bus ☐ 9.
Other (please specify)
______________ ☐
______________ ☐
______________ ☐

3b. Of the activities you have checked above, do you feel that any of them would be affected in any way, by the addition of OWMC-related traffic? Please identify these activities and describe how you feel they would be affected.

Activities	How They Would Be Affected

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3 Activity Would Be Affected Effects

INTERVIEW ID NUMBER ______

4. Did you have any plans to change or improve your house or property that you have put on hold due to OWMC selecting Regional Road 24 as its preferred access route?

YES ☐ NO ☐

PLEASE NOTE: This includes farm properties.

If yes, please specify. ______

5. If the OWMC facility is built in West Lincoln, what could OWMC do to address and alleviate your concerns about the addition of OWMC traffic to Regional Road 24?

6. Do you have any additional concerns about effects which may result from the addition of OWMC-related traffic to Regional Road 24?

7. Have you received any information from OWMC concerning the reasons for selecting Regional Road 24 as the preferred access route from the QEW to Highway 20?

YES ☐ NO ☐ DON'T KNOW ☐

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Y/N
4 ☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐
5 ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐
6 ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐
7 ☐

INTERVIEW ID NUMBER ______

8. Do you have any concerns, other than those related to transportation, about the OWMC facility that is proposed for West Lincoln?

____
____
____
____
____
____

9. How many people live in your household? ______

10. To which age group does each member of your household belong?

Age Groups:
0-4
5-9
10-14
15-19
20-24
25-34
35-44
45-54
55-64
65 and over

Age

Person #1 ______
Person #2 ______
Person #3 ______
Person #4 ______
Person #5 ______
Person #6 ______
Person #7 ______
Person #8 ______

11. Do you use your house or property for any farming or other business activity?

NO ☐ FARMING ☐ OTHER BUSINESS ☐

12. Is this property used by someone outside of your household for any business or farming activity?

a. YES ☐ NO ☐

If yes, please identify the name of the person, their address, telephone number, and type of business or farming activity.

b. Name: ______________________
Address: ______________________
____
Telephone: ______________

c. Type of Business or Farming Activity: ______________

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8 ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐
9 ☐☐
1 2 3 4 5 6 7 8
10 ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐
11 ☐
Y/N Y/N
12 a ☐ b ☐ c ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

INTERVIEW ID NUMBER _____

13. Are there any other comments that you wish to bring to the attention of OWMC?

PLEASE NOTE:

If you use your property for farming, please complete the attached Form Survey. (blue pages)

If you use your property for other business activity, please complete the attached Business Survey. (yellow pages)

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13 ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

INTERVIEW ID NUMBER ______

BUSINESS SURVEY

The **Business Survey** is to be completed only by those households who use their house or property for a business activity other than farming.

1. For what type of business do you use your house or property?

Agri-Business

Fruit and Vegetable Sales ______1.
Horse Training/Boarding ______2.
Kennels ______3.
Farm Equipment Sales and Service ______4.

Other (write in)

______________________ ______
______________________ ______
______________________ ______

Other Business

Real Estate ______21.
Antiques ______22.
Furniture Manufacturing/Refinishing ______23.
Crafts ______24.
Insurance ______25.
Construction/Home Improvements ______26.
Other (write in)

______________________ ______
______________________ ______
______________________ ______

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1. ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

INTERVIEW ID NUMBER ______

2. Do the existing traffic conditions on Regional Road 24 affect your business activities in any way?

YES ☐ NO ☐ DON'T KNOW ☐

If yes, which business activities and how are they affected?

Activity	How Affected
______________	______________________ ______________________
______________	______________________ ______________________
______________	______________________ ______________________
______________	______________________ ______________________
______________	______________________ ______________________
______________	______________________ ______________________

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2 Y/N ☐

ACTIVITY	HOW AFFECTED				
☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
☐☐	☐☐	☐☐	☐☐	☐☐	☐☐

INTERVIEW ID NUMBER ______

3. Do you think the addition of OWMC-related traffic would affect your business operation?

YES ☐ NO ☐ DON'T KNOW ☐

If yes, please list the business activities that would be affected and indicate how you feel they would be affected

Activity	How Affected
______	______ ______
______	______ ______
______	______ ______
______	______ ______
______	______ ______

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Y/N

3 ☐

ACTIVITY

HOW AFFECTED

INTERVIEW ID NUMBER ______

FARM SURVEY

The **Farm Survey** is to be completed only by those households who use their property for farming.

1. Do the existing traffic conditions on Regional Road 24 affect your farming activities in any way?

YES ☐ NO ☐ DON'T KNOW ☐

If yes, which farming activities and how are they affected?

Activity	Affected by Traffic YES	Affected by Traffic NO	How Affected
1. Machinery movement	☐	☐	______
2. Service Vehicles	☐	☐	______
3. Customer Stops	☐	☐	______
4. Raising livestock	☐	☐	______
5. Raising poultry	☐	☐	______
6. Growing crops	☐	☐	______
7. Moving cattle across the road	☐	☐	______
8. Produce sales	☐	☐	______
Other (please specify) ______	☐	☐	______
______	☐	☐	______
______	☐	☐	______

FOR OFFICE USE ONLY

Y/N ☐

ACTIVITY

HOW AFFECTED

INTERVIEW ID NUMBER ______

2. Do you think the addition of OWMC-related traffic would affect your farm operation?

YES ☐ NO ☐ DON'T KNOW ☐

If yes, please list the farming activities that would be affected and indicate how your business might be affected.

Activity	How Affected

FOR OFFICE USE ONLY

Y/N

2 ☐

ACTIVITY HOW AFFECTED

INTERVIEW ID NUMBER ______

ADDENDUM 1 - FARM RELATED USE OF REGIONAL ROAD 24

If you use your property for farming, please answer the following questions.

Please Note:

If you are an owner-operater, please answer all of the following questions.

If you farm part of the property, and rent part to someone else, please answer the questions for your operation only. We will contact the tenant for the remaining information.

If you are a tenant please answer all of the following questions.

---

1. What properties do you farm along Regional Road 24?

Lot	Concession

2. Are any of your land or buildings along Regional Road 24 rented to someone else for farming purposes?

YES ☐ NO ☐

If the land or buildings are rented, please identify the location and the tenant.

Lot: ______________ Concession: ______________

Name: ______________ Phone: ______________

Address: ______________________________

3. How many tillable acres do you farm in total? ______________

4. How many of these acres have their main access point from Regional Road 24? ______________ acres

INTERVIEW ID NUMBER _____

5. Farming Activities (Please fill out Question 6 for each separate property which abuts Regional Road 24. If more than one property is farmed, the interviewer will provide additional questionnaires for each property when they call back.)

How would you describe the farming activity which you carry out on this farm property? (Please check one.)

Cash Crop		☐
Mixed Crop and Livestock		☐
Specialist Livestock	dairy	☐
	beef	☐
	hogs	☐
	poultry	☐
Horses		☐
Fruits		☐
Vegetables		☐

Other (please explain)

____

____

6. On the chart below, please describe the type and number of livestock which you are currently housing in buildings on this property

Livestock Type	Numbers of Livestock

None ☐

7. Do you pasture livestock in the fields abutting Regional Road 24?

YES ☐ NO ☐

If yes, what is the total number of livestock? __________

INTERVIEW ID NUMBER ______

8. Traffic Patterns. We would like you to think of each time you travel on this access road with a piece of farm machinery or equipment. First of all, on the chart below, identify all the different machines and machinery combinations that you move on or across the access road. Then, estimate the average mileage per trip and the number of trips. If you need additional space, please use the back of this page.

Description of Machine or Machine Complement	Distance Travelled Per Round Trip? (Miles)	Number of Times - Choose One From Below				Year Round (Check)	Seasonal (Number of Months)
		Year	Month	Week	Day		
						☐	
						☐	
						☐	
						☐	
						☐	
						☐	
						☐	
						☐	
						☐	
						☐	
						☐	
						☐	
						☐	
						☐	
						☐	

INTERVIEW ID NUMBER ______

9. Truck Traffic: Could you indicate the type and frequency of vehicle traffic turning in and out of your laneway on a regular basis?

	(Check)	Per Month	Per Year	Year Round (Check)	Seasonal (Number of months)
Milk truck	☐	______	______	☐	______
Feed Truck	☐	______	______	☐	______
Livestock Truck	☐	______	______	☐	______
Customers for:					
fruit or vegetable stand	☐	______	______	☐	______
"pick your own"	☐	______	______	☐	______
Other ______________	☐	______	______	☐	______
______________	☐	______	______	☐	______
______________	☐	______	______	☐	______
None	☐				

Do you need to move livestock across the access road?

YES ☐ NO ☐

(Choose one) Number per year ______ or month ______ or week ______

10. On the chart below, please indicate the farm water supply and its use.

Water Supply	Livestock	Irrigation	Domestic
Drilled Well	☐	☐	☐
Dug Well	☐	☐	☐
Stream	☐	☐	☐
Cistern	☐	☐	☐
Municipal Main	☐	☐	☐
Other (e.g., ponds)			
____________________	☐	☐	☐

APPENDIX B

PHASE 4B WINDSHIELD SURVEYS

INTRODUCTION

An inventory of crops and livestock was undertaken for farmed properties in the local community where farmers declined to participate in the survey or a respondent declined to answer questions in Sections D and E.

CROP SURVEY PROCEDURES

The roadside survey was conducted from August 5 to August 15, 1986. The procedure for the survey is summarized as follows:

1. The boundaries of properties with missing crop and livestock information were delineated on a 1:10,000 scale photomosaic.

2. Two employees of Ecologistics Limited drove along area roads and marked crop types (on a field by field basis) and land uses on the photomosaic map according to the codes as identified in Appendix A-1 (see Section entitled "Interviewing Procedures"). Any crops or land uses that could not be verified from the road were left as questions on the photomosaic. These areas were subsequently completed at Ecologistics Limited based on the predominant crop type identified by the O.M.A.F. Land Use Systems Mapping for that particular area.

3. Any fields which had been harvested were assumed to have been in winter wheat. This assumption was made based on the windshield survey time frame which generally coincided with the wheat harvest. A distinction could not be made between grain and silage corn and therefore a more generalized code for corn was used.

4. The location of barns was plotted on the 1:10,000 scale photomosaic. Codes indicating the type of livestock housed and/or use were marked on the map as follows:

MAP CODE	MAIN LIVESTOCK TYPE OR USE
PY	Poultry
DB	Dairy
BB	Beef
PB	Hogs
SB	Sheep
HB	Horses
GB	Goats
FB	Foxes
QB	Quail
VB	Unused
GH	Greenhouse

5. The number of pasturing livestock were recorded on the map adjacent to the barn.

6. The windshield survey was undertaken just as the questionnaire surveys were being completed. If a respondent agreed to an interview after the windshield surveys were completed, his/her information was used in place of the windshield survey data.

7. The area of crops and other land uses were measured on a field by field basis on the 1:10,000 photomosaic base maps using a Planix 7 electronic planimeter.

RESULTS

The working maps for the windshield survey are on file at Ecologistics Limited. This information on crops and livestock was then added to the data base of information collected from the personal interviews. The compilation procedures for these supplementary data are described in Appendix D.

APPENDIX C

CENSUS DATA

Selected agricultural statistics were compiled from the Census of Agriculture and the Census of Population (1966-1986), Statistics Canada, to facilitate the agricultural impact analysis. These statistics were tabulated for four separate geographical areas including the former Gainsborough Township, West Lincoln Township, the Regional Municipality of Niagara, and the Southern Ontario Region.[1] West Lincoln Enumeration Area (E.A.'s) 203, 204, 205, 206, 207 and Pelham 168/169 comprise the E.A.'s covering the former Gainsborough Township. A special data run from Statistics Canada was required to obtain these data at the E.A. level. Table C-1 outlines the statistics which were compiled for each of the geographical areas.

The tabulation of Census data served essentially three purposes. First, these data helped to establish the regional and local agricultural context within which agricultural activity in the local community is occurring. To this end, data which corresponded to the types of information obtained in the Phase 4B survey of farm operators were summarized for West Lincoln, Niagara and the Southern Ontario Region. These data, summarized in Table C-2, were particularly useful in describing existing agricultural conditions (Chapter 4).

Secondly, some of these same data and others in Table C-3 were essential to conducting the analysis of agricultural and land use trends

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[1] Includes the Counties of Brant, Elgin, Essex, Haldimand-Norfolk, Hamilton-Wentworth, Kent, Lambton, Middlesex, Niagara and Oxford.

TABLE C-1

TYPE OF STATISTICS TABULATED FOR EACH GEOGRAPHIC AREA

STATISTIC	GAINSBOROUGH TOWNSHIP E.A.´S	WEST LINCOLN	REGIONAL MUNICIPALITY OF NIAGARA	SOUTHERN ONTARIO REGION
Number of Census Farms		+[1]	+	+
Total Farmed Area	+	+	+	+
Owned Farmland		+	+	+
Rented Farmland		+	+	+
Improved Land	+	+	+	+
Area Under Crops	+	+	+	+
Tame Hay	+	+	+	+
Wheat	+	+	+	+
Grain Corn	+	+	+	+
Oats	+			+
Barley	+			+
Mixed Grains	+			+
Buckwheat	+			+
Soybeans	+			+
Other Field Crops	+			+
Vegetables	+			+
Tree Fruits	+			+
Small Fruits	+			+
Nursery	+			+
Pasture	+			+
Fallow Land	+			+
Unimproved Land	+			+
Woodland	+			+
Other (swamp, wetland)	+			+
Milk Cows		+	+	+
Pigs		+	+	+
Hens and Chickens		+	+	+

---

[1] Indicates that this statistic was obtained from the Census of Agriculture.

TABLE C-2

SELECTED AGRICULTURAL STATISTICS FOR WEST LINCOLN TOWNSHIP, NIAGARA REGION AND SOUTHERN ONTARIO REGION* - CENSUS OF AGRICULTURE, 1961-1986

		1961	1966	1971	1976	1981	1986	Percent Change 1961 to 1986
Census Farms (#)								
West Lincoln		769	753	701	571	675	620	- 19
Niagara		4,732	4,543	3,950	3,030	3,512	3,147	- 33
Southern Ontario Region		39,867	36,752	32,716	27,169	27,975	24,914	- 37
Ave. Farm Size								
West Lincoln	ha	44	44	45	49	45	48	9
	ac	108	109	110	122	111	118	9
Niagara	ha	25	26	26	30	29	30	20
	ac	62	63	64	75	71	75	20
Southern Ontario Region	ha	44	47	51	60	59	64	46
	ac	108	117	127	148	146	158	46
Owned Farm Land								
West Lincoln	ha	N/A	N/A	N/A	N/A	22,901	21,988	--
	ac	N/A	N/A	N/A	N/A	56,589	54,335	--
Niagara	ha	78,932	99,753	82,736	67,205	70,534	66,956	- 15
	ac	195,040	246,488	204,437	166,061	174,288	165,453	- 15
Southern Ontario Region	ha	1,228,381	1,448,230	1,306,628	1,200,715	1,201,782	1,134,834	- 8
	ac	3,035,288	3,578,527	3,228,634	2,966,927	2,969,563	2,804,237	- 8

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* Southern Ontario Region, as defined by the Census of Agriculture - 1986, includes the Counties of Brant, Elgin, Essex, Haldimand-Norfolk, Hamilton-Wentworth, Kent, Lambton, Middlesex, Niagara, and Oxford.

TABLE C-2 - cont´d

SELECTED AGRICULTURAL STATISTICS FOR WEST LINCOLN TOWNSHIP, NIAGARA REGION AND SOUTHERN ONTARIO REGION - CENSUS OF AGRICULTURE, 1961-1986

		1961	1966	1971	1976	1981	1986	Percent Change 1961 to 1986
Rented Farm Land								
West Lincoln	ha	N/A	N/A	N/A	N/A	7,413	7,566	--
	ac	N/A	N/A	N/A	N/A	18,319	18,697	--
Niagara	ha	12,176	15,319	19,469	25,036	30,097	28,930	138
	ac	30,087	37,853	48,107	61,863	74,368	71,489	138
Southern Ontario	ha	279,626	297,800	380,835	426,354	449,345	455,867	63
Region	ac	690,946	735,854	941,031	1,053,507	1,110,315	1,126,473	63
Improved Land								
West Lincoln	ha	28,102	27,627	25,685	24,336	26,354	25,105	- 11
	ac	69,441	68,266	63,468	60,135	65,121	62,037	- 11
Niagara	ha	97,083	97,001	85,187	80,676	89,011	83,441	- 14
	ac	239,891	239,689	210,498	199,350	219,948	206,189	- 14
Southern Ontario	ha	1,433,258	1,477,830	1,424,541	1,423,444	1,477,003	1,408,740	- 2
Region	ac	3,541,581	3,651,717	3,520,041	3,517,329	3,649,676	3,481,074	- 2
Area Under Crops								
West Lincoln	ha	19,869	20,737	20,496	20,182	22,191	21,142	6
	ac	49,097	51,240	50,646	49,869	54,834	52,244	6
Niagara	ha	71,586	73,032	67,231	67,137	74,815	70,964	- 1
	ac	176,890	180,463	166,128	165,895	184,868	175,356	- 1
Southern Ontario	ha	1,040,840	1,139,034	1,169,688	1,243,660	1,329,776	1,285,131	24
Region	ac	2,571,915	2,814,553	2,890,300	3,073,084	3,285,877	3,175,629	24

TABLE C-2 - cont´d

SELECTED AGRICULTURAL STATISTICS FOR WEST LINCOLN TOWNSHIP, NIAGARA REGION AND SOUTHERN ONTARIO REGION - CENSUS OF AGRICULTURE, 1961-1986

		1961	1966	1971	1976	1981	1986	Percent Change 1961 to 1986
Tame Hay								
West Lincoln	ha	N/A	13,014	10,767	9,941	9,772	9,792	- 25[1]
	ac	N/A	32,157	26,605	24,564	24,148	24,197	- 25
Niagara	ha	27,138	29,613	21,798	19,827	19,444	19,080	- 30
	ac	67,058	73,174	53,862	48,992	48,045	47,148	- 30
Southern Ontario Region	ha	215,405	228,455	170,149	155,948	130,324	129,843	- 40
	ac	532,266	564,512	420,439	385,347	322,030	320,851	- 40
Wheat								
West Lincoln	ha	N/A	571	1,136	1,850	2,267	2,375	316[1]
	ac	N/A	1,411	2,806	4,571	5,601	5,869	316
Niagara	ha	7,027	3,881	4,571	6,594	6,992	7,676	9
	ac	17,363	9,590	11,294	16,294	17,277	18,970	9
Southern Ontario Region	ha	139,864	85,987	102,565	150,017	138,281	155,173	11
	ac	345,605	212,473	253,439	370,691	341,693	383,441	11
Grain Corn								
West Lincoln	ha	N/A	893	1,195	1,771	4,071	3,250	264[1]
	ac	N/A	2,207	2,953	4,375	10,060	8,033	264
Niagara	ha	1,493	4,185	5,125	8,087	16,884	12,486	736
	ac	3,690	10,342	12,663	19,982	41,720	30,856	736
Southern Ontario Region	ha	142,131	266,211	349,678	388,447	453,743	405,374	185
	ac	351,205	657,807	864,055	959,852	1,121,200	1,001,702	185

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[1] Percent change is for 1966-1986.

TABLE C-2 - cont´d

SELECTED AGRICULTURAL STATISTICS FOR WEST LINCOLN TOWNSHIP, NIAGARA REGION AND SOUTHERN ONTARIO REGION - CENSUS OF AGRICULTURE, 1961-1986

	1961	1966	1971	1976	1981	1986	Percent Change 1961 to 1986
Milk Cows							
West Lincoln	8,097	8,186	7,16	6,472	5,967	5,467	- 32
Niagara	19,079	18,084	14,422	12,397	11,188	9,652	- 49
Southern Ontario Region	219,723	200,539	158,041	137,412	111,578	98,137	- 55
Pigs (total)							
West Lincoln	5,341	9,524	20,467	19,398	27,372	21,121	296
Niagara	22,614	35,060	56,349	46,158	71,861	68,791	204
Southern Ontario Region	490,951	618,611	870,037	725,980	1,197,127	1,217,896	148
Hens and Chickens (total)							
West Lincoln	397,013	828,060	1,176,349	1,284,573	1,733,538	1,644,306	314
Niagara	1,472,994	2,719,940	3,439,211	4,039,042	4,906,546	4,774,381	224
Southern Ontario Region	8,647,050	10,018,889	12,465,226	12,439,762	14,391,609	13,210,079	53

TABLE C-3

SELECTED AGRICULTURAL STATISTICS

		Local Community[1] 1986	Gainsborough Township[2]				Southern Ontario[2] Region 1986
			1966	1981[1]	1986[3]	Percent Change (1966-1986)	
Total Area	ha	9,378	17,071	17,071	17,071	---	2,096,909
	ac	23,174	42,182	42,182	42,182	---	5,181,461
Total Farmed Area	ha	8,567	14,996	13,799	14,413	- 4	1,590,701
	ac	21,170	37,054	34,098	35,614	- 4	3,930,710
Proportion of Farmed Area to Total Area (%)		91	88	81	84	- 4	76
Improved Land	ha	7,363	12,753	12,101	12,133	- 5	1,408,740
	ac	18,194	31,513	29,904	29,979	- 5	3,481,074
- Cropped Land	ha	5,730	9,424	10,119	10,130	+ 8	1,285,131
	ac	14,159	23,287	25,003	25,031	+ 8	3,175,629
- Pasture	ha	423	2,361	831	733	-69	54,266
	ac	1,046	5,833	2,054	1,810	-69	134,096
- Fallow	ha	389	564	605	620	+10	29,902
	ac	960	1,394	1,496	1,533	+10	73,891
- Other - idle	ha	599	---	---	---	---	---
	ac	1,479	---	---	---	---	---
- buildings	ha	223	404	547	650	+61	39,439
	ac	550	999	1,351	1,605	+61	97,458
Unimproved Land	ha	1,204	2,242	1,697	2,281	+ 2	181,961
	ac	2,976	5,541	4,193	5,635	+ 2	449,636
- Woodland	ha	1,112	1,412	1,087	1,045	-26	94,862
	ac	2,747	3,490	2,686	2,581	-26	234,411
- Other (swamp, wetland)	ha	93	834	610	501	-30	47,131
	ac	229	2,061	1,507	1,239	-30	116,465

TABLE C-3 - cont´d

SELECTED AGRICULTURAL STATISTICS

	Local Community[1] 1986	Gainsborough Township[2] 1966	1981[1]	1986[3]	Percent Change (1966-1986)	Southern Ontario[2] Region 1986
Proportion of Improved Land to Total Farmed Area (%)	86	85	88	84	- 1	89
Proportion of Cropped Land to Total Farmed Area (%)	67	63	73	70	+ 7	81
Proportion of Woodland to Total Farmed Area (%)	13	9	8	7	- 2	6

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[1] 1986 questionnaire survey of farm operators and windshield survey.
[2] Census of Agriculture, Statistics Canada.
[3] 1981 and 1986 data based on enumeration areas for old Gainsborough Twp.

within the local community for Chapter 5 - Future Scenario for Agriculture. Data in Table C-3 were compiled from the 1966 and 1986 E.A. information corresponding to old Gainsborough Township. Trends in agriculture within this geographic area were the best available approximation of what could be expected to occur in the future within the local community.

Thirdly, selected Census data were used to verify the representativeness of the questionnaire data. Details of these calculations can be found in Appendix D.

APPENDIX D
QUESTIONNAIRE DATA ANALYSIS

INTRODUCTION

This appendix documents tasks undertaken to analyse questionnaire data. Where questionniare data were incomplete or unobtainable, the means of supplementing the data base and methods of extrapolation are presented. Included are discussions of:

- supplementary data sources,
- summary statistics,
- gross farm revenue calculations,
- employment analyses, and
- statistical testing of data.

Sufficient detail is provided to give the reader insight into the analytic methods, but complete listings of data and summary statistics are not given. These are kept on file in the consultant's office.

COMPILATION OF SUPPLEMENTARY DATA

This section documents the types and sources of data used in supplementing agricultural information which was not obtained as a result of individuals declining to participate in the Phase 4B interview survey, or at least declining comment on certain of the agricultural questions. Supplementation of missing information for crops and livestock was required to complete the data base necessary for establishing a baseline set of agricultural conditions.

The procedure for collecting missing crop information has been described in Appendix B. Integration of these results into the overall data set is described later in this Appendix.

Several different sources of information were used to supplement missing livestock data. First, primary livestock data obtained within 2 km of the site at the time of the Phase 4A farm surveys were used. These data were deemed acceptable for inclusion in the current data base after comparing livestock information from farm operators who had completed both Phase 4A and 4B survey questionnaires. The comparison indicated that very few changes in types or numbers of livestock had occurred over the years between study phases.

Secondly, livestock data for farms located 2-5 km from the site - obtained at the time of the Phase 4A livestock inventory - were used. This inventory had been compiled with O.M.A.F. county office staff who provided estimates of the type and number of animals present on a farm-by-farm basis. Where information was not held in confidence, Marketing Boards identified the type and size of quota held by producers within this area.

Finally, for those farms located beyond the 5 km zone, but still within the local community, livestock type and number were estimated during the course of the Windshield Survey. Barns with no livestock were readily identified, as were the numbers of pasturing sheep, horses and beef cattle. The observations of types of barns and livestock were supplemented by Marketing Board quota-holder information for poultry and dairy enterprises. Where the number of hogs was not known, an average of the larger (responding) operations in the local community was used.

All of the missing information described above (including the types of crops and their planimetered areas - see Appendix B) was incorporated into the computer data base. Thus, for the respondents who declined to answer agricultural questions (Sections D and E of the questionnaire), supplementary crop and livestock information was added to their questionnaire form and coded for entry into the data base. The source of the supplementary data was noted on the questionnaire form.

For those who declined to participate in the entire interview, the relevant sections of the questionnaire were filled out with supplementary data, coded, and entered into the data base. The complete list of supplementary data includes name, address, property roll number of residence and location zone (e.g. on-site, adjacent properties, etc.), most of which were derived from the Ministry of Revenue assessment rolls. In addition, data from the following sections and questions in the interview form were included:

- Section C (Source: Ministry of Revenue)
  - Q29 - roll number of parcel
  - 30 - area of parcel (ha)
  - 31 - tenure (owned or rented)
  - 32 - name of renter (if applicable)
- Section D (Source: windshield survey)
  - Q35 - crops (type and area)
  - 36 - other land uses
- Section E (Source: windshield survey, Phase 4A questionnaire, Marketing Boards, O.M.A.F. staff)
  - Q38 - whether or not livestock or poultry were present
  - 39 - type and number of livestock or poultry
  - 40 - quota (if known or applicable)

These questionnaire data were entered into a separate computer file for further data analysis purposes.

GENERATION OF SUMMARY STATISTICS

Questionnaire data were encoded in data base files using input programs within the computer language dBase III plus (see Appendix A-1 for coding procedures). Subsequently, programs were written in the same language to derive the following summary statistics:

for quantitative data (crop acres, number of jobs, etc.)
- totals, means, frequency distributions by farm size

for categorical data (yes/no, coded responses, etc.)
- frequency counts by response type or code
- percentage rates by response type or code

Certain questions were complex, yielding tabular arrays of information. For categorical data in tabular arrays, percentage response rates were calculated using the following base values in the denominator:

- total number of respondents
- row totals
- column totals
- total number of responses (sum of row totals and column totals)

For simple categorical questions, percentages were calculated based on number of respondents and number of responses.

In generating summary statistics, the following entries were counted but not subsequently used in percentage calculations:

Blank (i.e. no response recorded)
"V" = no comment
"W" = unclear if question asked
"X" = refused to answer
"Z" = not applicable

Using these programs, summary statistics were generated for the entire data set and for various sub-groups including:

- farm/non-farm respondents
- resident/nonresident in the study area
- intending to leave/not intending to leave if the facility is built.

In addition, a number of cross-tabulations were prepared for specific questions or groups of questions.

In the case of agricultural data compiled from supplementary sources to fill in for questionnaire refusals, summary statistics were also generated using the approach discussed above.

STATISTICAL TESTING

While the original objective of the Phase 4B farm survey was to achieve complete coverage, interview questionnaires were obtained for only 79 out of an estimated 139 farms that are headquartered in the study area. This sample represents 57% of total farms (see Appendix A-1).

In order to verify that sample data were representative of all farms in the study area, eleven different statistical comparisons were made. Data representing the total population of study area farmers were obtained from the 1986 census.

The census data covers enumeration areas numbered West Lincoln 204, 205, 206 and Pelham 168/169. These do not correspond exactly to the study area. In particular, a portion of the study area found in enumeration area 203, covering 5.4 km^2 (1344 ac), is missed, while 12.1 km^2 (2993 ac) of enumeration areas 204 and 205 which fall outside the study area are included in the census totals. These discrepancies are not significant considering the total study area size which is 93.8 km^2 (23,180 ac).

The discrepancies in areal coverage suggest that some divergence of the sample and census statistics is to be expected for reasons other than sampling error. To determine whether differences between the study and the 1986 census results are statistically signficant, a broad range of basic economic and farm characteristics were selected for comparison. They comprise:

- mean gross farm income per farm (agricultural income only)
- mean number of livestock per farm:
    - total cattle (all beef and dairy cattle including calves)
    - dairy cows (milkers only)
    - total pigs
- mean number of crop acres per farm:
    - wheat
    - grain
    - tame hay
- proportion of farm operators with no off-farm work
- distribution of farms by size class
- distribution of farms by gross farm income class

Mean values for eight data series are provided in Table D-1. These were compared using the t-test. Results show that none of the eight variables for the questionnaire sample are significantly different from the census.

The proportion of farm operators with no off-farm work was 0.55 for the sample (n=96) and 0.65 for the census data. Based on the binomial test, the 95% confidence interval for the sample proportion is (0.45, 0.66). The census proportion borders on this zone and, so a conclusion of

TABLE D-1

COMPARISON OF MEANS OF FARM STATISTICS FOR PHASE 4B AND CENSUS DATA

STATISTICS	1986 CENSUS DATA[1] MEANS	PHASE 4B SURVEY DATA MEAN	ST. DEV.	SAMPLE SIZE[2]	T-SCORE	CRITICAL T-VALUE (P=0.05)
Farm Size (acres)	115.7	149.5	183	79	1.64	1.99
Gross Farm Income ($1985)						
per farm	$125,650	$126,678	$164,220	54	0.19	2.01
Livestock (number)						
total cattle/farm	50.9	42.6	40.8	44	-1.35	2.02
dairy cows/farm	36.6	40.5	16.7	18	0.99	2.10
pigs/farm	442.3	388.3	388.2	9	-0.42	2.31
Crops (acres)						
wheat/farm	32.6	30.0	28.3	33	-0.53	2.02
grain corn/farm	54.7	45.6	46.1	32	-1.17	2.02
tame hay/farm	66.5	59.0	60.7	57	-0.93	2.00

NOTES: 1. Includes data for enumeration areas 204, 205, 206 in West Lincoln and 168/169 in Pelham.
2. Sample size given for reporting farms. For example, only 44 farms reported having cattle.

no significant difference may be warranted. However, the census reports the information of only one operator per farm, while the survey accommodated multiple operators reporting off-farm work. It is impossible to determine whether more or less off-farm work would be reported on the census if all (principal) operators were allowed to respond. Hence, the validity of this test of difference is marginal, although significant as completed.

Distributional data for farm size and farm income are provided in Table D-2. Chi-square statistics, computed from these data, are 10.51 for farm size and 8.21 for farm income. Both of these statistics lie within the 95% confidence interval (11.07), suggesting that the sample distributions are not significantly different from census distributions.

Hence, these statistical tests confirm that the sampled farms as a group are representative of area farms in terms of agronomic characteristics.

EMPLOYMENT ANALYSIS

The impact on farm employment was estimated for farm displacement and for various out-migration scenarios. The questionnaire data provided the basis for estimation of this impact.

Where employment data were reported by farm operators included in displacement or out-migration scenarios, these figures were used directly without modification. For other farm operators who either refused to respond to the entire questionnaire or who did not respond to questions on employment, on-farm employment was estimated based on average employment rates per farm for reporting farms. In the case of an on-site dairy operation, average employment rates for reporting dairy farms were used for estimation; otherwise, overall averages were used.

TABLE D-2

COMPARISON OF INCOME AND FARM SIZE DISTRIBUTIONS FOR PHASE 4B AND CENSUS DATA

a) Farm Size

Cell Range (acres)	Census Farms		4B Survey Farms		
	number	percent	number	percent	expected number[1]
1-2	8	5.0	2	2.5	3.5
3-9	7	4.4	3	3.8	6.6
10-69	48	30.0	33	41.8	22.3
70-129	39	24.4	14	17.7	24.4
130-179	18	11.3	5	6.3	6.6
180-239[2]	17	10.6	6	7.6	6.1
240-399	14	8.8	9	11.4	6.1
400+	9	5.7	7	8.9	3.6
TOTALS	160	100.0	79	100.0	79.2

b) Gross Farm Income

Cell Range ($1986)	Census Farms		4B Survey Farms		
	number	percent	number	percent	expected number[1]
under $2,500	21	13.1	17	21.5	16.6
$ 2,500-4,999	14	8.8	8	10.1	10.9
$ 5,000-9,999	24	15.0	4	5.1	9.7
$ 10,000-24,999	18	11.3	14	17.7	6.7
$ 25,000-49,999	15	9.4	9	11.4	8.7
$ 50,000-99,999[2]	14	8.8	5	6.3	12.2
$100,000-249,999	32	20.0	12	15.2	10.0
$250,000+	22	13.8	10	12.7	4.3
TOTALS	160	100.0	79	100.0	79.1

NOTES:

[1] expected number calculated as (census percent/100) x sample size.

[2] the mean value falls within the indicated cell.

Summary employment statistics from questionnaire data are provided in Table D-3. Calculations are provided in Table D-4.

GROSS FARM REVENUE CALCULATIONS

Gross farm revenues were estimated for use in characterizing the local agricultural community and to help describe the significance of on-site farm displacement and of the out-migration scenarios.

Gross farm revenues were estimated using the following data on local farm production:

- 1986 inventory of crops and livestock found on each farm as reported in the questionnaire survey or identified through windshield surveys and other sources (see earlier sections of this Appendix)

- 1985 sales of agricultural products as reported in the questionnaire survey.

Economic data used for purposes of calculation are provided in Tables D-5 and D-6.

For farm operations with 1985 crop and livestock sales data reported in the Phase 4B questionnaire, gross farm revenue was estimated as:

(Gross farm revenue based on 1985 sales) =
(no. animals sold) x (value/animal)
+ (quantity of eggs or milk sold) x (unit value)
+ (crops produced) x (proportion sold) x (unit value)

If sales data were not provided, the calculation was based on reported 1986 production as follows:

TABLE D-3

FARM EMPLOYMENT STATISTICS FOR PHASE 4B QUESTIONNAIRE DATA

FARM TYPE	SAMPLE[1] SIZE	IMMEDIATE FAMILY[2]			OTHER FAMILY[3]			HIRED HELP[4]			TOTAL		
		WKS/A	FT JOBS	PT[5] JOBS	WKS/A	FT JOBS	PT JOBS	WKS/A	FT JOBS	PT JOBS	WKS/A	FT JOBS	PT JOBS
		- number/farm -											
All Farms	68	84.7	1.28	1.40	8.2	0.15	0.18	3.0	0.01	0.28	96.0	1.44	1.85
Cash Crop	15	54.9	0.80	1.73	4.8	0.70	0.40	0.3	0.00	0.07	60.0	0.87	2.20
Dairy	16	119.3	2.00	1.31	21.6	0.38	0.38	6.2	0.00	0.50	147.1	2.38	2.19
Poultry	9	105.4	1.44	1.56	3.9	0.11	0.00	6.1	0.11	0.56	115.4	1.67	2.11
Beef	11	79.3	1.27	1.18	0.0	0.00	0.00	2.6	0.00	0.36	81.9	1.27	1.55
Swine	5	103.2	1.40	1.40	20.8	0.40	0.00	0.00	0.00	0.00	124.0	1.80	1.40

NOTES:

[1] Includes only farms with headquarters in the local community.

[2] Immediate family includes farm operator, spouse and dependents.

[3] Other family includes persons such as brothers, father, uncle, etc.

[4] Hired help is non-family hired help.

[5] wks/a = weeks per annum; FT = full-time; PT = part-time

TABLE D-4

ON-FARM EMPLOYMENT ESTIMATES

DESCRIPTION (COMMENT)	NUMBER OF FARMS	FAMILY (IMMED. & OTHER)			HIRED HELP			TOTAL		
		WKS/A	FT JOBS	PT JOBS	WKS/A	FT JOBS	PT JOBS	WKS/A	FT JOBS	PT JOBS
		total number								
Employment of Questionnaire Respondents (reported)	68	6,323	97	107	207	1	19	6,530	98	126
All Farms in Study Area (estimated)	143	13,296	204	226	435	1	40	13,731	205	266
On-Site Farms (one reporting, one estimated)	2	165	4	3	6	-	>1	171	4	3
Out-Migration (estimated)										
- refused to answer questionnaire	36	3,344	51	57	108	>1	10	3,452	52	67
- refused to answer employment question	4	372	6	6	12	-	1	384	6	7

NOTES: 1. There were 64 refusals and 7 respondents refusing the employment question; 56% of these were assumed to leave the area based on questionnaire results.

TABLE D-5

ANNUAL LIVESTOCK AND POULTRY REVENUE ASSUMPTIONS

LIVESTOCK OR LIVESTOCK PRODUCT	VALUE TO ESTIMATE ANNUAL REVENUE (1985$)	DATA AND ASSUMPTIONS
Dairy Cattle	$1,720/cow	- 80% of cows are milked - 4,800 kg milk/cow year - $42.00/hectolitre - 103 kg/hectolitre - sale value of livestock = 10% of gross milk sales
Milk Quota		
- liquid (l/d)	$ 188.705/daily litre	
- MSQ (l/yr)	$ .302/litre	
Beef Cattle:		
- Cow/Calf Operation	$ 320/cow	- 0.75 calves/cow - $95.70/calf at weaning - 30% turnover of breeding stock at $931/head - heifer calf replaces each cow sold
- Feedlot Operation	$2,600/head	-steers sold at 1,183 lb live weight for $.784/lb - 130 days to finish a steer
- Veal	$ 430/calf	- $154.70/calf - calves turned over 2.8 times/year
- Integrated Operation-Calving to	$ 700/cow	- see "cow/calf" for production assumptions - finished animals sold as for feedlot
Sheep	$ 130/ewe	- 1.2 lambs/ewe - 30% turnover of ewes and replacement with lambs - lambs sold for $87.07 - ewes sold for $52.50 - $3.37 worth of wool annually/ewe

TABLE D-5 - cont'd

ANNUAL LIVESTOCK AND POULTRY REVENUE ASSUMPTIONS

LIVESTOCK OR LIVESTOCK PRODUCT	VALUE TO ESTIMATE ANNUAL REVENUE (1985$)	DATA AND ASSUMPTIONS
Goats	$ 130/doe	- no milk sales - 2.2 kids/doe at $60.00/kid
Rabbits	$ 46/rabbit	- 8 weeks to raise a finished rabbit - $7.00/animal
Hogs		
- Farrow to Weaner Operation	$ 800/sow	- 16 piglets/sow at $65.00/piglet - 30% turnover of breeding stock with replacement gilts from piglets - $231.00/sow sold
- Farrow to Finish Operation	$1,830/hog	- see "Farrow to Weaner" for assumptions - finished hog sold at $148
- Feeder Hog Operation	$ 340/hog	- finished hog sold at $148 - hogs turned over at 2.3times/year
Hens		
- Egg Production	$ 19/hen	- 240 eggs annually/hen sold for $.078 each - hens replaced annually and sold for $.40 each
- Egg Quota	$ .936/dozen	- $.078/egg
- Broiler and Roaster Chickens	$ 8/chicken	- 1.86 kg birds sold for $1.11 - 4 crops per year
- Chicken Quota Broilers and Roasters	$ 1.11/kg	
- Pullets	$ 2.45/bird	

TABLE D-5 - cont'd

ANNUAL LIVESTOCK AND POULTRY REVENUE ASSUMPTIONS

LIVESTOCK OR LIVESTOCK PRODUCT	VALUE TO ESTIMATE ANNUAL REVENUE (1985$)	DATA AND ASSUMPTIONS
Turkeys		
- Broiler	$ 18/bird	- 2 crops/year - 6.35 kg/bird - $1.46/kg
- Turkey Quota	$ 1.46/kg	
Ducks	$ 23/bird	- 4.5 crops/year - $5.00/duck
Geese	$ 32/bird	- 2 crops/year - $16./goose

Data Sources:

Ontario Ministry of Agriculture and Food. 1986. "1985 Agricultural Statistics for Ontario." (price data)

Dr. D. Morrison. Personal Communication October 27, 1986. (price, weight and productivity data).

1986 Survey questionnaire in the local community (weight data).

TABLE D-6

CROP REVENUE ASSUMPTIONS

CROP TYPE	UNIT	YIELD/AC	VALUE/UNIT	VALUE/AC	COMMENT
Soybeans	bu	29	7.43	215	see note 2
Grain Corn	bu	78.4	3.14	246	see note 1
Silage Corn	tons	11.5	22.45	258	see note 1
Winter Wheat	bu	37.4	3.66	137	see note 1
Barley	bu	50.2	2.57	129	see note 1
Oats	bu	51.8	1.94	100	see note 1
Mixed Grain	bu	51.4	2.24	115	see note 1
Buckwheat	bu	21.4	3.44	74	see note 3
Hay	tons	3.2	49.2	157	see note 1
Clover Seed	lbs	.90	150	135	based on discussions with producers and buyers
Trefoil Seed	lbs	.90	150	135	based on discussions with producers and buyers
White Beans	cwt	13.3	25.03	333	See note 3
Sweet Corn	- -	- -	- -	3,600	based on Phase 4A crop value assumptions
Market Garden	- -	- -	- -	2,593	weighted average of 9 vegetable crops, see note 3
Orchard	- -	- -	- -	1,545	ave. of pears and apples, see note 3
Greenhouse Flowers	- -	- -	- -	90,000	based on discussions with producers

NOTE:
1. based on 5-year averages for Niagara County, O.M.A.F. Agricultural Statistics for Ontario.
2. based on 5-year averages for Southern Ontario, O.M.A.F. Agricultural Statistics for Ontario.
3. based on 5-year averages for Ontario, O.M.A.F. Agricultural Statistics for Ontario.

(Gross farm revenue based on 1986 production) =
(no. of animals on farm) x (annual revenue/animal)
+ (quota sales amount) x (unit sales value)
+ (total crop acreage - crop acreage for feed) x (value/acre)

For products sold under quota, data on quota were used where available to estimate annual revenue. Otherwise, numbers of animals were used for revenue calculations.

The above calculations were completed for each farm individually. The sample included 93 farms of which 79 were headquartered in the study area.

For all farm operators who refused to respond to the questionnaire, gross farm revenues were calculated using aggregated crop and livestock data assembled from windshield surveys and other sources (see earlier sections of this Appendix). The procedures for 1986 production outlined above provide the basis for calculation. The proportion of crop acreage for feed was assumed to be similar to the average values for the questionnaire respondents (see Table D-7).

Summary farm income statistics are provided in Table D-8.

TABLE D-7

USE OF CROPS BY PHASE 4B FARM QUESTIONNAIRE RESPONDENTS

CROP TYPE	AMOUNT FED (%)	AMOUNT SOLD (%)
Soybeans	- -	100
Grain Corn	37	63
Silage Corn	100	- -
Winter Wheat	1	99
Barley	54	46
Oats	35	65
Mixed Grains	94	6
Hay	84	16
Orchard[1]	- -	100
White Beans[1]	- -	100

NOTE: [1] Proportion assumed.

TABLE D-8

FARM INCOME DATA

	Number of Farms	Crop Revenue	Livestock and Livestock Products Revenue	Total Revenue
1. Farms Headquartered in Local Community				
- 4B questionnaire respondents	79	$ 736,100	$ 6,815,300	$ 7,551,400
- non-respondents[1]	64	$ 438,500	$ 7,878,600	$ 8,317,100
2. Farms Headquartered outside Local Community[1]	14	$1,053,100	$ 1,808,800	$ 2,861,900
3. Total:				
- headquartered farms	139	$1,174,600	$14,693,900	$15,868,500
- all farms	157	$2,227,700	$16,502,700	$18,730,400

[1] Includes only income generated from properties within the local community.

APPENDIX E

SUMMARY OF AGRICULTURAL IMPACT EVALUATIONS WITHOUT MITIGATION

APPENDIX E

This appendix consists of a table summarizing agricultural impacts without mitigation. The supporting analysis for this table is contained in Chapter 7.

TABLE E-1

SUMMARY OF AGRICULTURAL IMPACT EVALUATIONS WITHOUT MITIGATION

Factor[1]	Sensitivity to Change	Significance of Feature Affected	Magnitude of Effect	Frequency and Duration	Standards and Guidelines	Attitudes and Perceptions	Certainty of Prediction
ON-SITE:							
. Farm Displacement*	high - farm operators cannot readily start over given their ages	high - dairy farms are important in local community	low - 2 farms out of 139 in local community	permanent	n.a.	considered detrimental	certain
. Loss of Farm Land	n.a.	moderate - CLI Class 3 soils	low - limited area	permanent	high priority for preservation as farm land	considered detrimental	certain
LOCAL COMMUNITY:							
. Farm Displacement*	high - land needed to support current operation	high - livestock farms are important in local community	low - one farm affected	permanent	high priority for preservation as farm land	considered detrimental	certain
. Farm Family/Farm Operator Disruption*							
- in DIZ	high - many established farms, less amenable to change	high - livestock farms are important in local community	high - six farms with high impacts, 15 other farms	both temporary and long-term effects, enduring and transitory	noise guidelines exceeded, dust guidelines may be exceeded	high degree of concern near site	certain to uncertain
-outside DIZ	high - many established farms, less amenable to change	high - livestock farms are important in local community	moderate - 13 farms	enduring effects but at low levels	no exceedances	moderate concern away from site	certain to uncertain
. Farm Productivity Impacts							
-exposure to nuisance effects (noise, dust)	low - crop and livestock response anticipated	significant within each farm operation	negligible	negligible	n.a.	concern not directed to nuisance effects	uncertain
-atmospheric emission effects	---	---	---	---	---	---	---

TABLE E-1 - cont'd

SUMMARY OF AGRICULTURAL IMPACT EVALUATIONS WITHOUT MITIGATION

Factor[1]	Sensitivity to Change	Significance of Feature Affected	Magnitude of Effect	Frequency and Duration	Standards and Guidelines	Attitudes and Perceptions	Certainty of Prediction
-downstream agricultural activity (loss of water for livestock)	low - alternative water now available	low - not critical to farm operations	low - few pastures	seasonal over life of facility	n.a.	no concern expressed	certain
. Farm Business Impacts							
-decrease in property value*	variable, depends on financial position of farm	may be significant to certain farms	moderate - 5% loss of value	lasting 5 years	n.a.	widespread expectation of declining values	uncertain
-loss of product sales	high - sensitive to adverse publicity	low - limited to few operators and products	negligible	negligible	n.a.	farmers anticipate sales impacts	uncertain
-local services	no associated impacts are anticipated						
. Agricultural Community Impacts							
-out-migration of* farm operators	high - loss of farmers without replacement can harm farm community	high - farm community fosters commercial agriculture	moderate - likely less than 15 farms	transitory if new farmers come in	n.a.	out-migration expected to occur and be detrimental	uncertain
-non-farm in-migration	moderate - loss of land base for farming	high - most area operations are dependent on land for crops	cannot be forecast accurately	ongoing change	n.a.	favourably viewed on average	uncertain
-erosion of community networks	moderate - loss of key members will be disruptive	high - farm organizations fill important roles in the community	cannot be forecast accurately	ongoing change	n.a.	viewed as detrimental	uncertain
-off-farm employment with OWMC	low - though certain farm families may benefit	moderate - off-farm employment can affect type of operation	cannot be forecast accurately	ongoing change	n.a.	viewed favourably	uncertain

TABLE E-1 - cont'd

SUMMARY OF AGRICULTURAL IMPACT EVALUATIONS WITHOUT MITIGATION

Factor[1]	Sensitivity to Change	Significance of Feature Affected	Magnitude of Effect	Frequency and Duration	Standards and Guidelines	Attitudes and Perceptions	Certainty of Prediction
-change in local agricultural* character	high - livestock operations are sensitive to various forces of change	high - livestock is a major revenue generator	cannot be forecast accurately	ongoing change	n.a.	not known	uncertain
. Agribusiness Impacts	high - for small local operators with fewer customers	high - agribusiness performs an essential function	cannot be forecast accurately	transitory	n.a.	not known	uncertain
ACCESS ROADS:							
. Loss of Farmland	low	low	low - small area	permanent	high priority for preservation as farmland	not known	certain
. Farm Family/Farm Operator Disruptions (noise, dust)	low	low	low impacts are predicted	negligible	no exceedances	concerns about noise, dust and salt spray were expressed	uncertain
. Farm Productivity							
-exposure to nuisance effects (noise, dust)	no associated impacts are anticipated						
-interference with* farm vehicles	low - vehicles already exposed to considerable traffic	high - farming of distant properties is a common occurrence	high - heavy traffic on certain stretches of road	long-term	within MTC criteria for road use	concern about traffic interference expressed	certain
. Access Road Risk	---	---	---	---	---	---	---
REGIONAL:							
. Farm Productivity Impacts							
-atmospheric emission effects	---	---	---	---	---	---	---

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[1] Significant impacts are expected for factors marked with an asterisk.

APPENDIX F

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APPENDIX G

LAND USE MAP REFERENCES

This appendix identifies the land use features shown on the map (Figure 4.3) contained in the pocket at the back of this report. The various features are identified by number and name below; the number corresponds to the exact location of the feature in Figure 4.3.

COMMUNITY AND RECREATION FEATURES

1. Hitchcock Cemetery
2. St. Anns Cemetery
3. St. Anns Community Church
4. Lane Cemetery
5. Silverdale United Church
6. Silverdale Community Centre
7. Silverdale Gun Club
8. Gainsborough Central Elementary School and West Lincoln Co-op Nursery School
9. Bismarck United Church and Cemetery
10. Gainsborough Conservation Area
11. Gainsborough Centennial Hall
12. Boyle Brethren in Christ Church
13. Bethel Community Church
14. Dufferin Masonic Lodge
15. Wellandport Branch of the West Lincoln Public Library
16. Emmanuel United Church
17. Oddfellows Temple
18. Wellandport Post Office (also considered a business by Morehouse Economic Planning Consultants)
19. Wellandport Community Centre and Park
20. Niagara Regional Sportsmens Gun Club
21. Riverview Golf and Country Club

COMMERCIAL

A. AGRIBUSINESSES

22. Smithville Quail and Game Farm
23. Silverdale Feed Mill
24. Comfort and Tylee (considered an industrial use by Morehouse Economic Planning Consultants)
25. Peninsula Farm Supply Limited
26. Ross Allen (custom work)
27. Douma Farm Supply
28. Peninsula Grain and Elevators Limited
29. Flikkema Aviaries
30. Lincoln Meat Market
31. Wellandport Farm Supply and Home Hardware
32. Robbins Feed and Fuel Limited
33. Horse Farm and Arena
34. Harvey and Carol Pot (custom work)

B. OTHER BUSINESSES

35. Meyer Auto Wrecker
36. John´s Auto Body
37. D.G. Baker (income tax and general contractor)
38. Korney´s Coffee Shop
39. Vos Builders
40. St. Anns Snack and Gas Bar
41. Babcock B.R. Ltd. Garage
42. Pat´s Auto Service
43. Meisel Auto Scrap
44. Bismarck Variety
45. Ray´s Lumber
46. Bismarck Garage

COMMERCIAL

B. OTHER BUSINESSES - cont´d

47. A. & B. Service Station
48. Ox-bow Restaurant
49. Silverdale Variety (vacant)
50. Region Car and Truck
51. McIntosh Cycle
52. Davison Pools
53. J. Peters Auto Machine Shop
54. Lorries Hair Styling
55. Beavercreek Construction
56. Wellandport General Store
57. R. McCollum Transport
58. Hoekstra Construction
59. Wellandport Auto and Truck Services
60. John Schilstra Insurance
61. Byrd´s Furniture Stripping
62. Vanderheide Auction Services
63. J.F. Auto Performance
64. B. Reaman Septic Tank Service
65. Trailer Park
66. Vanderlee Truck Service (vacant)
67. Dick DeVries Plumbing and Heating
68. The Spare Room (vacant)
69. Pioneer Products
70. Regional Truck and Equipment
71. Robbins Gas Bar
72. Ernie´s Garage
73. L. & J. General Repairs and Used Cars
74. Peninsula Auto Repairs
75. Bradshaw Realty

INDUSTRIAL

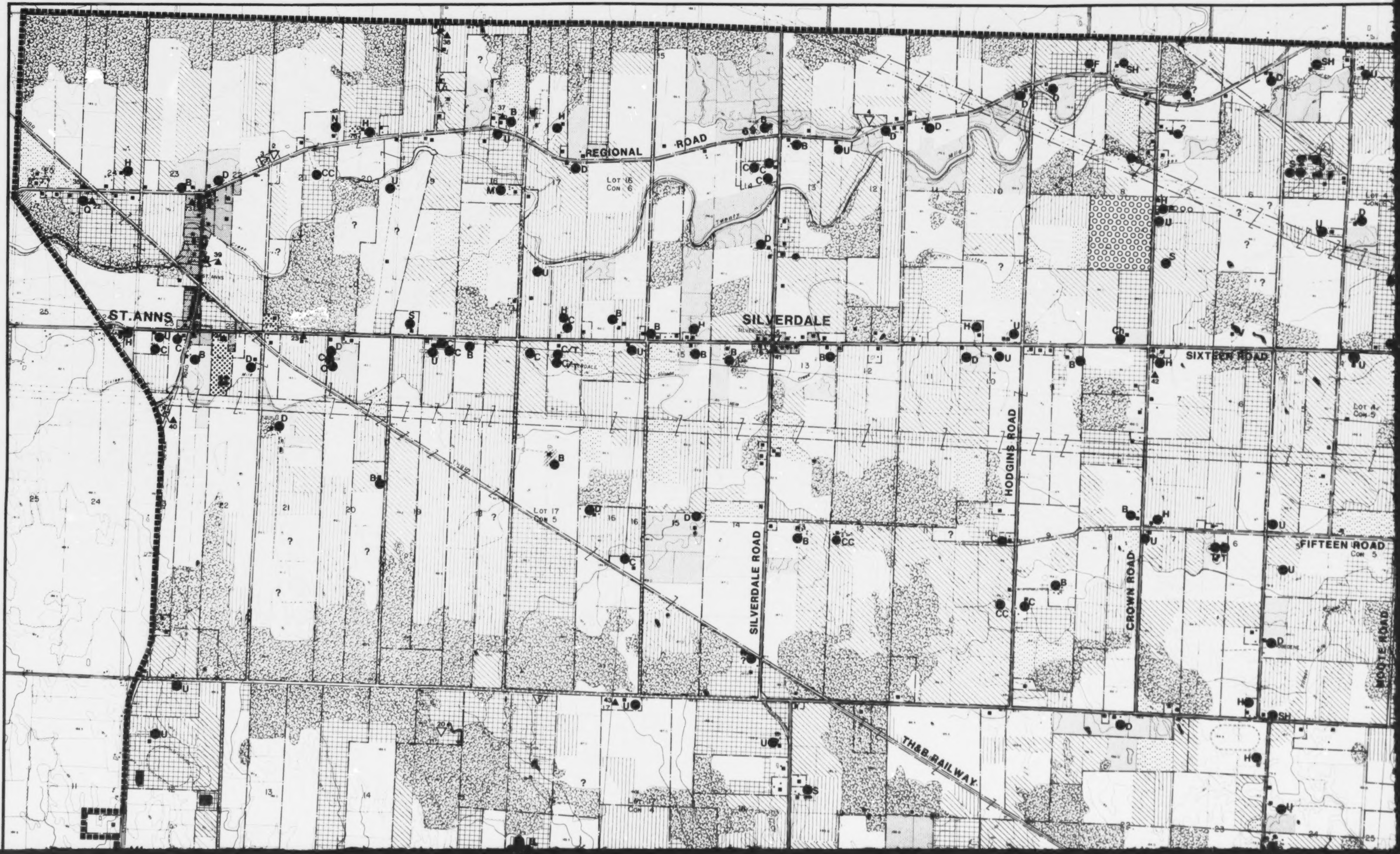
76. Clark Pallet Industries
77. Jayway Enterprises (welding)
78. Oak Ridge Woodworking
79. Robertson's Enterprises

Sources:

Community and Recreation Features were provided by the Institute of Environmental Research.

Businesses and Industries were provided by Morehouse Economic Planning Consultants, and OWMC.

Agricultural Land Uses, barns and agribusinesses were mapped by Ecologistics Limited in the summer of 1986.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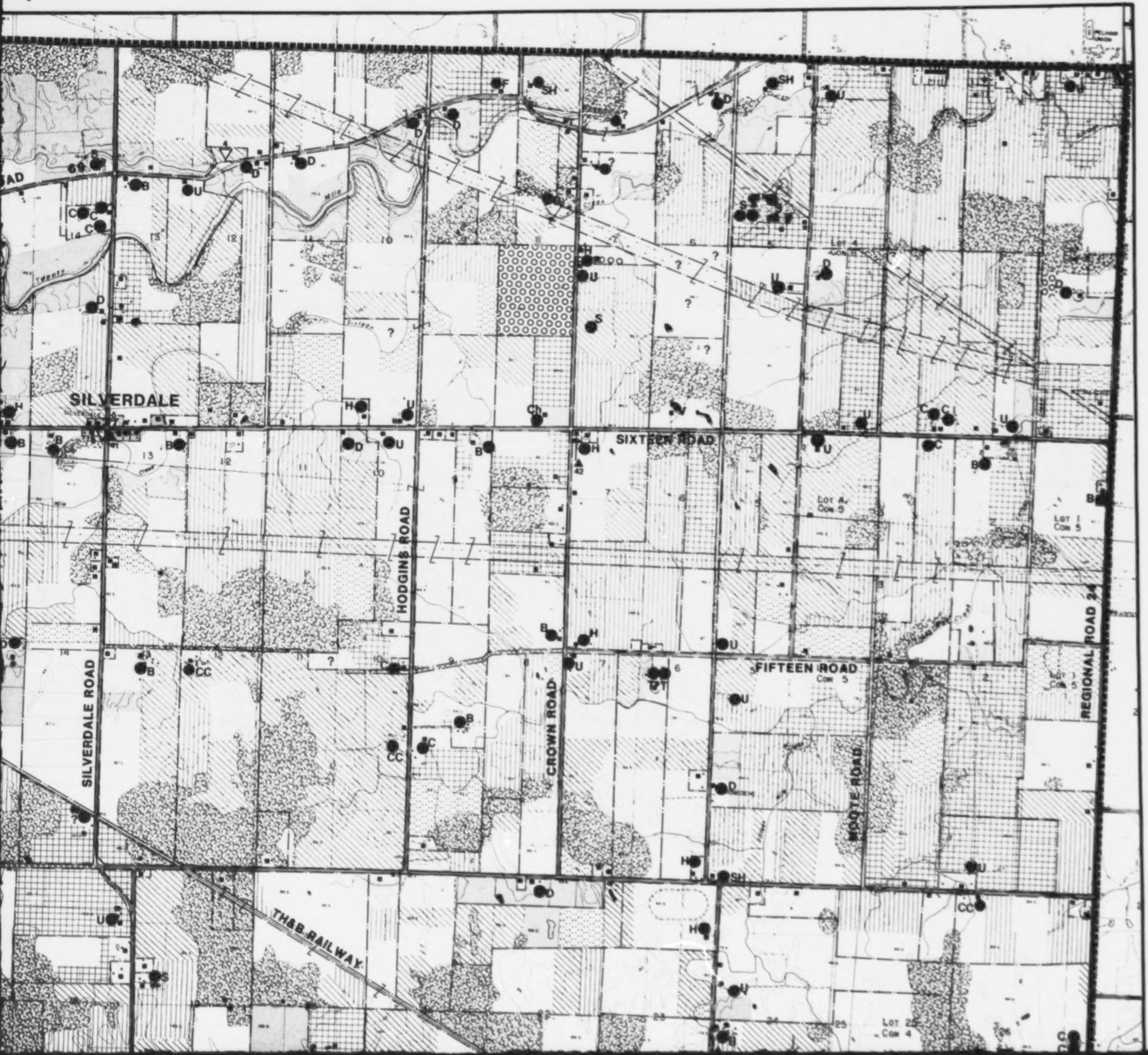
ST. ANNS
SILVERDALE
SIXTEEN ROAD
FIFTEEN ROAD
HODGINS ROAD
SILVERDALE ROAD
CROWN ROAD
MOOTE ROAD
TH&B RAILWAY
Lot 16 Con 6
Lot 17 Con 5
Lot 4 Con 5
Lot 4 Con 4
Con 5
Lot Con 4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SIXTEEN ROAD
FIFTEEN ROAD
HODGINS ROAD
CROWN ROAD
SILVERDALE ROAD
MOOTE ROAD
REGIONAL ROAD 24
TH&B RAILWAY
LOT 4 CON 5
LOT 1 CON 5
LOT 25 CON 4

OWMC Ontario Waste Management Corporation

Consultant:

ecologistics limited

PLANNERS • LANDSCAPE ARCHITECTS • ENVIRONMENTAL SCIENTISTS

Legend:

☐ Preferred Site

▪▪▪▪▪ Local Community Boundary

— - — Property Ownership Boundaries

AGRICULTURAL LAND USES

Crops

▥	Row Crops	☐	Pasture
☐	Summer Fallow	▩	Fruits and Vegetables
☐	Hay	▦	Nurseries and Market Gardens
▨	Small Grains		

Other

▩ Woodlot

▦ Idle

■ Ponds

● **Farm Building Complexes**

Livestock (dominant type)

C - Chickens
T - Turkeys
S - Hogs
D - Dairy
B - Beef
SA - Sheep
H - Horses
G - Goats
F - Foxes
Ch - Chinchilla
Q - Quail
M - Mixed

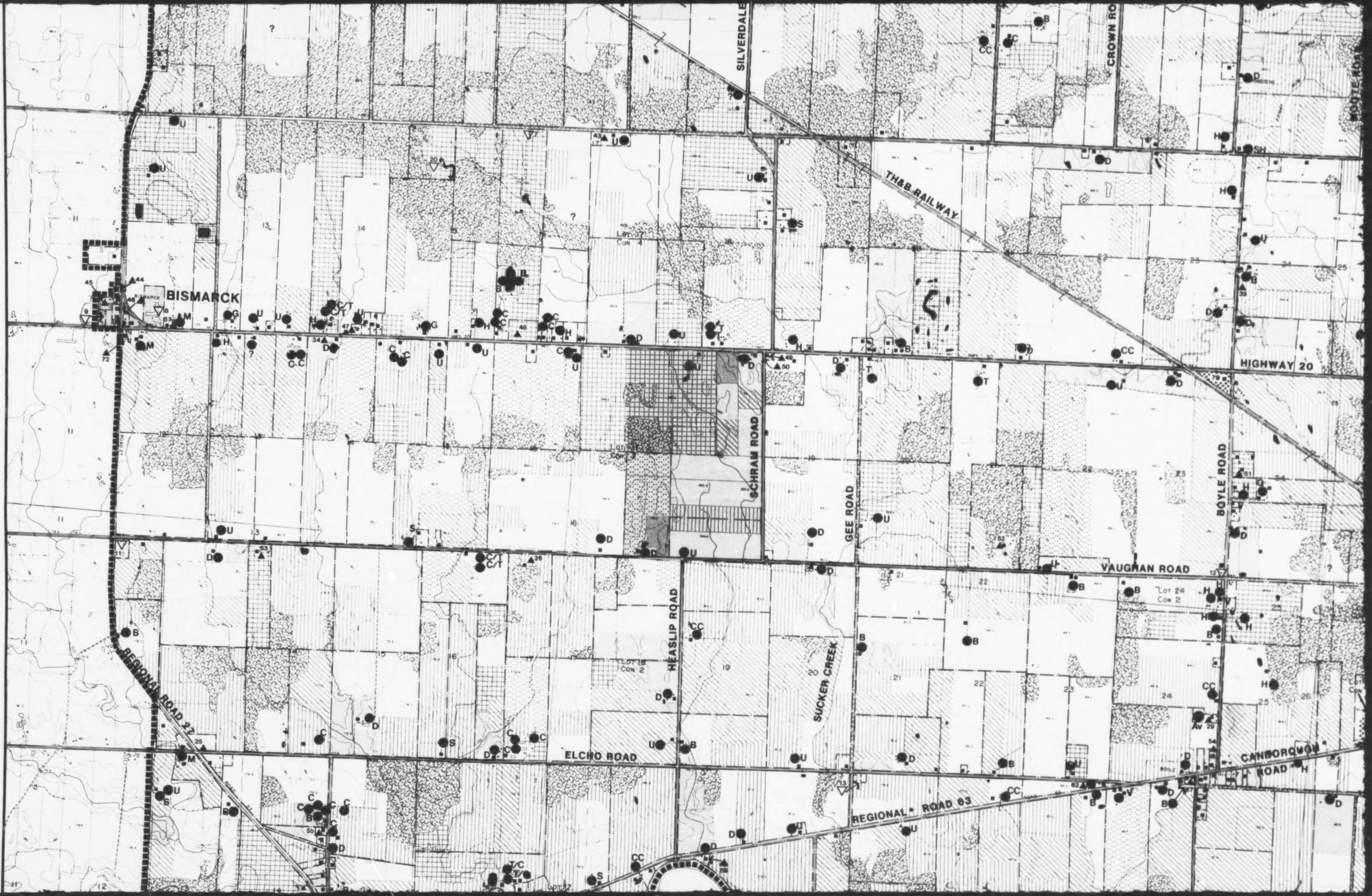
Non-Livestock

CC - Cash Crops
N - Nursery/Greenhouse
AV - Aviary
U - Unused/Derelict

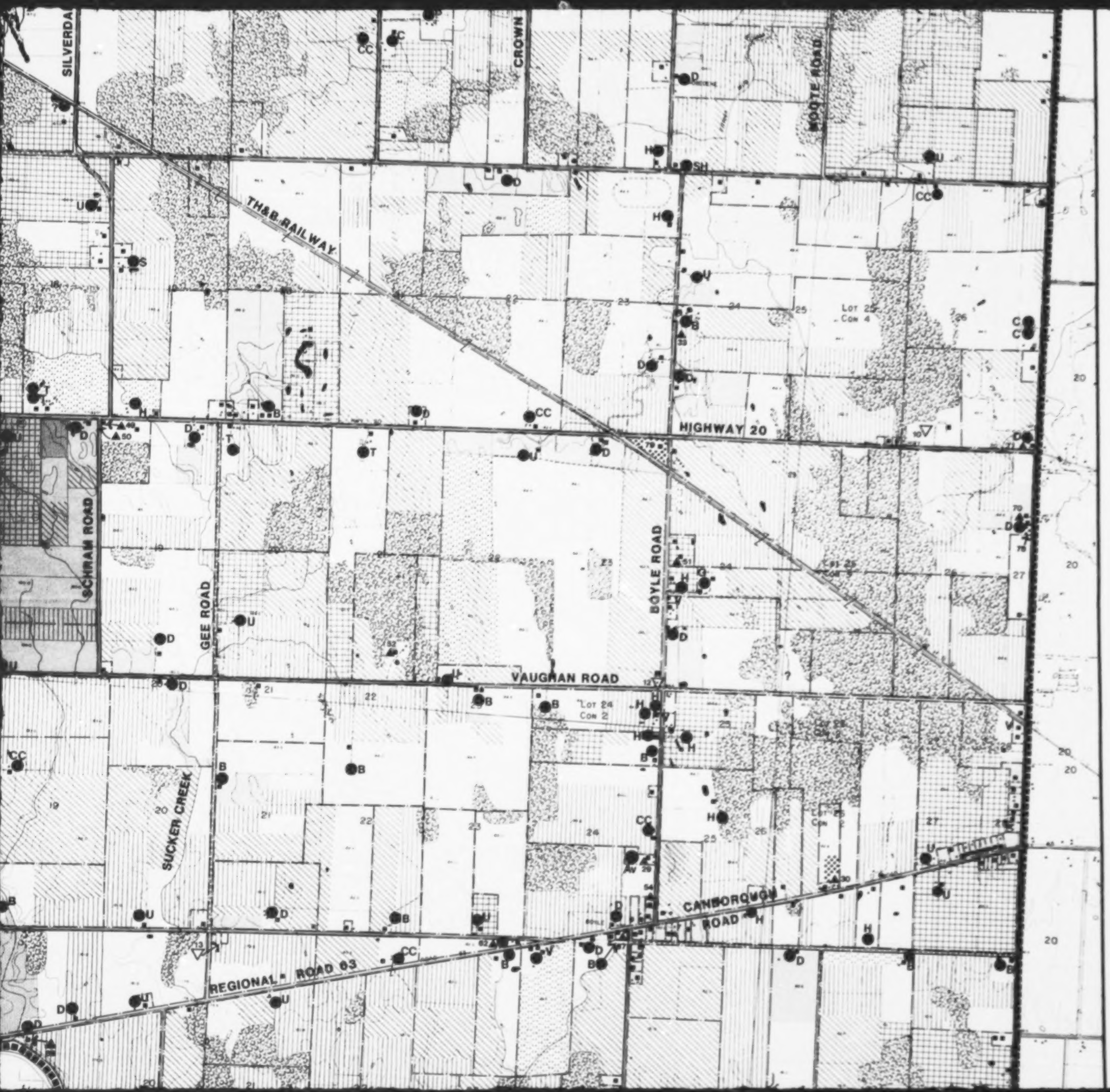
NON AGRICULTURAL LAND USES

• Residence

☐ Village, Hamlet



BISMARCK
SILVERDALE
CROWN RO
MOOTE RO
TH&B RAILWAY
HIGHWAY 20
SCHRAM ROAD
GEE ROAD
BOYLE ROAD
VAUGHAN ROAD
HEASLIP ROAD
SUCKER CREEK
REGIONAL ROAD 22
ELCHO ROAD
REGIONAL ROAD 63
CANBOROUGH ROAD
LOT 4 CON 4
LOT 17 CON 3
LOT 18 CON 2
LOT 24 CON 2


SILVERDA
CROWN
MOOTE ROAD
TH&B RAILWAY
HIGHWAY 20
LOT 25 CON 4
SCHRAM ROAD
GEE ROAD
BOYLE ROAD
VAUGHAN ROAD
LOT 24 CON 2
SUCKER CREEK
CANBOROUGH ROAD
REGIONAL ROAD 63

▨ Ponds

● **Farm Building Complexes**

Livestock (dominant type)

C - Chickens T - Turkeys S - Hogs D - Dairy B - Beef SA - Sheep
H - Horses G - Goats F - Foxes Ch - Chinchilla Q - Quail M - Mixed

Non-Livestock

CC - Cash Crops N - Nursery/Greenhouse AV - Aviary U - Unused/Derelict

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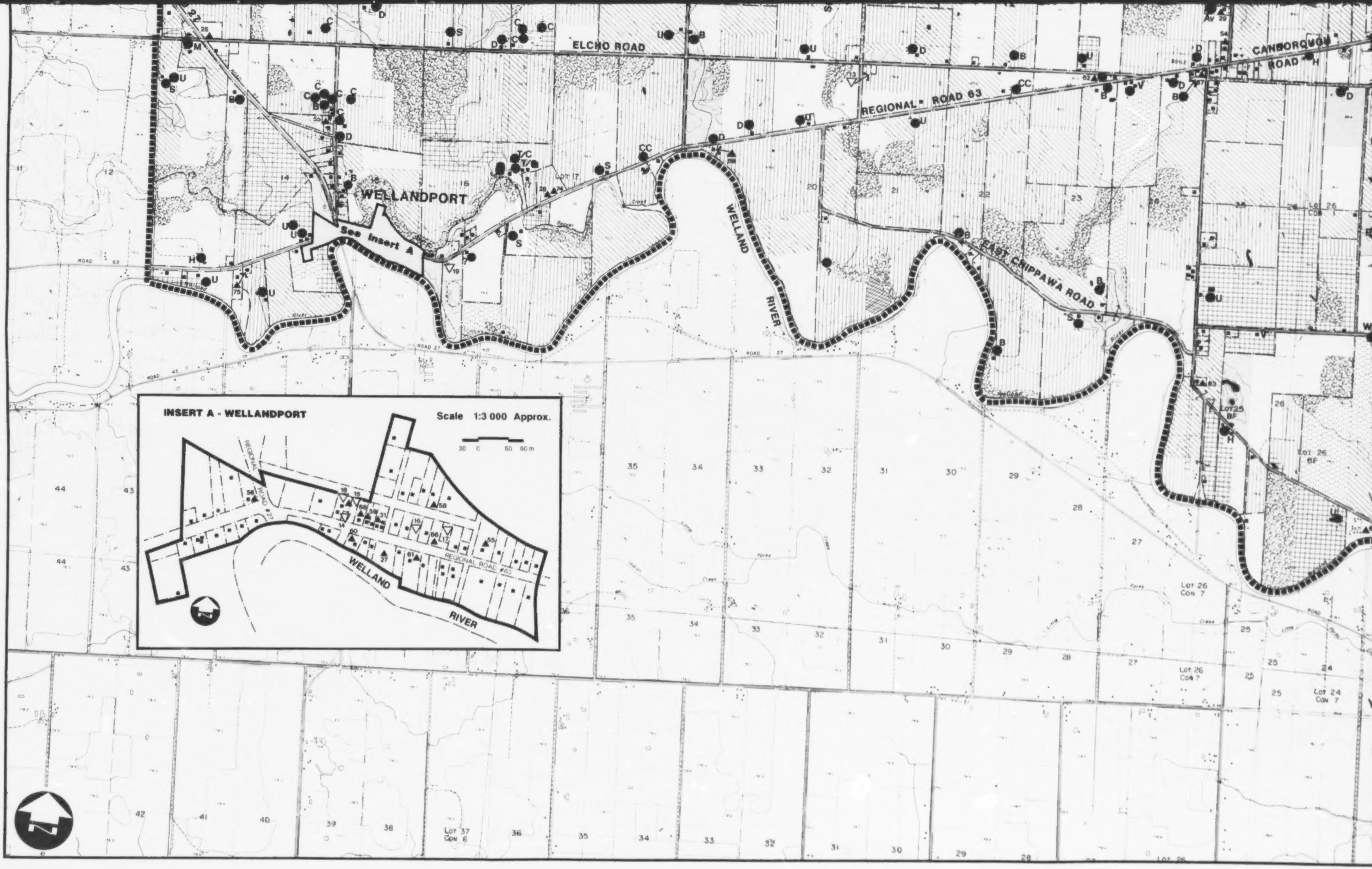
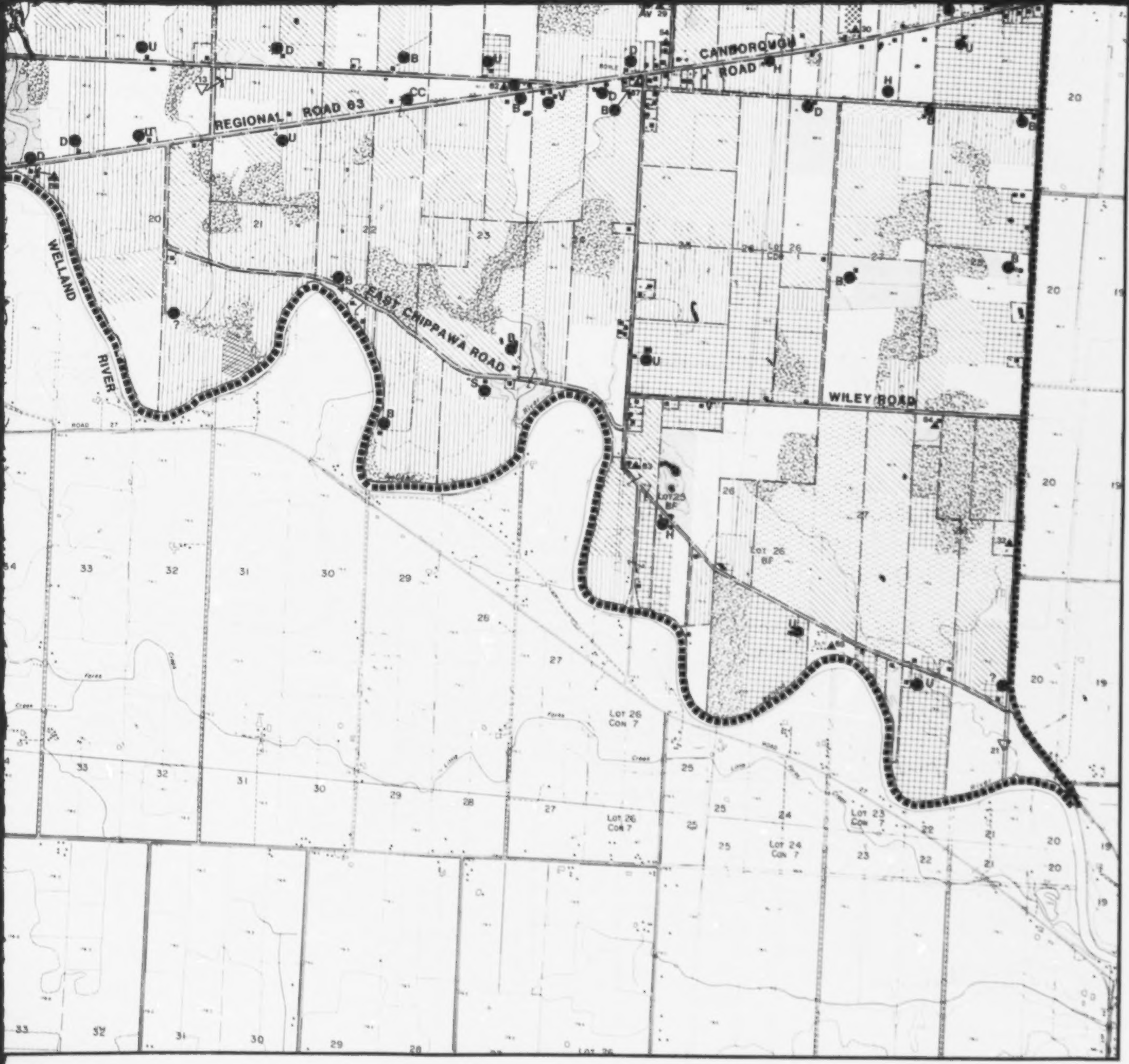
NON AGRICULTURAL LAND USES

▪ Residence
▪V Vacant Residence
▽ Community and Recreation Feature
▲ I.D. NUMBER Commercial

☐ Village, Hamlet
▨ Industrial
? Use Unknown


ELCHO ROAD
CANBOROUGH ROAD
REGIONAL ROAD 63
WELLANDPORT
See Insert A
WELLAND RIVER
EAST CHIPPAWA ROAD
ROAD 63
ROAD 27
ROAD 45
LOT 17
LOT 26 CON 7
LOT 24 CON 7
LOT 25 BF
LOT 26 BF
LOT 37 CON 6
INSERT A - WELLANDPORT
Scale 1:3 000 Approx.
30 0 60 90 m
REGIONAL ROAD #27
REGIONAL ROAD #63
WELLAND RIVER


CANBOROUGH ROAD
REGIONAL ROAD 63
WELLAND RIVER
EAST CHIPPAWA ROAD
WILEY ROAD
LOT 26 CON 7
LOT 24 CON 7
LOT 23 CON 7
LOT 25 BF
LOT 26 BF
Forks Creek

Sources/Notes

For a listing of Community, Recreation, Commercial/Industrial Features and Sources, See Appendix G of Site Assessment, Phase 4B: Agriculture. Ecologistics Limited. 1988.

Scale 1:20,000

500 0 1,000 1,500

LAND USE

January 1988

Figure 4.3